Round Test 2019-1 on

Stickiness Characterization Methods

- FINAL REPORT –

date: June 28, 2019

Stickiness Task Force of the 'International Committee on Cotton Testing Methods' (ICCTM) of the 'International Textile Manufacturers Federation' (ITMF)

Gourlot Jean-Paul [(1)]
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[(1)] CIRAD, France, [(2)] FIBRE, Germany, and [(3)] ICA Bremen, Germany

Contents

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Introduction

Confidentiality and use of information from this report

This report is both public and confidential:

- It is public as it will be released on the internet website of the ITMF (www.itmf.org) without providing any private information.

- It also is confidential as we provide Participating Laboratories with their own confidential laboratory LabID code that gives access to understanding each piece of information of the report; indeed with this LabID code number, more information can be extracted from the report. Please note that this LabID is changed for each test.

The Authors will not be held responsible to any degree for dissemination of the LabID code after the confidential distribution of their LabID code to the participating laboratories.

Preparation of cottons and samples

A range of five cottons was selected for their stickiness potential range. Basically, the stickiness level of these cottons is not known a priori and their level is being better known after the test, expecting that these cottons cover a range of stickiness.

All cottons in this test got a similar level of homogenization using an homogenizing machine developed during CFC/ICAC/33 project 'CSITC' project (so called CSITC homogenizing machine). The main goal of this preparation is to ensure that any drawn sample from the original mass would carry the "same" stickiness potential as any other sample for evaluating the laboratory performance, but without affecting too much the size of individual sticky points that could affect some measurement methods.

The degree of this preparation affects the distribution of sticky points within the mass of the fibers. When homogenization is 'perfectly performed', then the sticky point distribution follows Poisson's distribution within the fibers; in other cases, sticky point distribution follows over-dispersed distributions, such as negative binomial distributions. In these conditions, many repetitions of measurements are required to statistically compare laboratory performances or method performances.

From the beginning, we knew that homogenizing the cottons would induce 'preparation', and this was several times reported to us with the results. However, this has been the only way to ensure that all samples would be 'alike' for any given cotton in order to compare method performances or laboratory performances within methods.

Once the cottons were homogenized, samples were drawn from their original cotton mass, and ranges of cottons were constituted for each participating laboratory, whatever the method used. Envelopes were sent out to laboratories in end of March 2019.

All laboratories were supposed to send their results back by May 24, 2019. Practically, this date was reported to JUne 17, 2019. This FINAL REPORT is prepared after this date when most Laboratories who received the material lately sent back their results.

Organizing this round-test, at present running for free, takes time and uses precious materials; therefore we really appreciate when all registered Laboratories who received RT samples provided us with results.

Organization of this report

As stated in the Contents,

- Individual results provided by Participating Laboratories are reported, cotton by cotton, sorted by method and then by LabID. A mail was sent out in a confidential manner to each participating laboratory for reading this public report, and therefore getting more out of it.

- Statistics are then presented in summary tables or in boxplot charts, cotton by cotton, sorted by method and then by LabID. This section allows the comparison of results by LabID within each method. Both the mean results and the variation of individual results are then highlighted.

- Correlation matrix are given for comparing LabID Mean results cotton by cotton, and sorted by method.

- Charts linking the within-laboratory variances of LabIDs for each method to the calculated mean results per LabID are displayed. Precision and accuracy of individual LabID performance can be deduced from these charts.

- Finally, distances between LabID mean result to the Grand Mean are displayed by method, sorted by method and by LabID.

Conversion of 'laboratories raw records' into numeric data for use in this report

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Answers to this round-test were provided **freely** by laboratories in a table having five columns (one per cotton) and six lines (for potentially recording six results for each cotton) for a total of 30 table cells.

For comparing results between laboratories, results were expected to be reported in a coordinated and harmonized manner within each method. However, for this test also, laboratories reported results the way they probably are used to do in their every day practice: the observation is that the report was not always harmonized within methods.

For allowing a comparison, we were obliged to convert some laboratory records into harmonized numeric values by applying the following rules when needed (most accronyms are explained in the 'Frequently asked questions' section):

- For Caramelization : one measurement = one cell. No transformation of the data.
- For Clinitest: >1: was converted into 1.5.
- For Contest and Fibermap: Since RT2018-1 included: these devices are using the same technology for characterizing stickines and their results are grouped together into one single 'Contest-Fibermap' category. No transformation of the data.
- For GB/T13785-1992: one measurement = one cell. No transformation of the data.
- For H2SD: one measurement = one cell. No transformation of the data.
- For HSI-NIR: one measurement = one cell. No transformation of the data that has been calibrated to H2SD count at the beginning.
- For KOTITI: grades were converted into numeric values as follows:
  - A: 0
  - A+ = B-: 1
  - B: 2
  - B+ = C-: 3
  - C: 4
  - C+ = D-: 5
  - D: 6
  - D+ = E-: 7
  - E: 8
  - E+: 9.
- For minicard: ITMF grades 0 to 3 were used for reporting, one measurement = one cell. No transformation of the data.
- For Qualitative:

  - NIL: 0
  - Trace: 1
  - Light: 2

- For SCT: one measurement = one record = sum of reading of top foil + reading of bottom foil.
- For TDM-A: one measurement = one record. No transformation of the data.

All individual results per Method and LabID for each cotton [1]

[1] Footnote

* Results sorted by Method and then by LabID.
* NA or NaN : no results provided.

Table for Cotton A

Meth	LabID	R1	R2	R3	R4	R5	R6	Un
Carameliza	115	2.0	2.0	2.0	2.0	1.3	2	Color degree
Carameliza	135	1.4	NA	NA	NA	NA	NA	Color degree
Carameliza	140	4.3	NA	NA	NA	NA	NA	Color degree
Carameliza	145	2.5	3.2	NA	NA	NA	NA	Color degree
Carameliza	150	2.1	NA	NA	NA	NA	NA	Color degree
Clinitest	10	1.0	1.0	1.5	NA	NA	NA	Color chart
Contest-Fi	20	308.0	316.0	264.0	364.0	281.0	NA	C/F Grade
Contest-Fi	75	137.0	251.0	156.0	256.0	179.0	167	C/F Grade
Contest-Fi	85	299.0	295.0	172.0	180.0	322.0	260	C/F Grade
Contest-Fi	90	300.0	261.0	249.0	262.0	281.0	244	C/F Grade
H2SD	35	102.0	47.0	63.0	38.0	40.0	43	Sticky point
H2SD	80	15.0	12.0	12.0	31.0	21.0	NA	Sticky point
H2SD	120	43.0	29.0	24.0	17.0	21.0	47	Sticky point
H2SD	125	23.0	21.0	13.0	22.0	19.0	24	Sticky point
HSI-NIR	130	38.0	41.0	42.0	38.0	39.0	42	Sticky point
KOTITI	65	9.0	8.0	8.0	8.0	8.0	9	KOTITI Grade
Minicard	25	1.0	2.0	2.2	NA	NA	NA	ITMF grade
Minicard	50	0.0	0.0	1.0	NA	NA	NA	ITMF grade
Minicard	105	3.0	3.0	3.0	3.0	3.0	3	ITMF grade
Qualitativ	95	2.0	2.0	2.0	2.0	2.0	2	Grade
Quantitati	100	0.5	0.4	0.5	0.5	NA	NA	Percent
Reactive S	15	1.5	1.0	1.5	NA	NA	NA	Spray Grade
SCT	5	48.0	40.0	43.0	NA	NA	NA	Sticky point
SCT	30	28.0	15.0	22.0	25.0	14.0	25	Sticky point
SCT	40	36.0	42.0	38.0	37.0	34.0	32	Sticky point
SCT	45	0.0	2.0	0.0	NA	NA	NA	Sticky point
SCT	55	25.0	30.0	41.0	NA	NA	NA	Sticky point
SCT	60	35.0	31.0	34.0	38.0	24.0	25	Sticky point
SCT	70	40.0	33.0	37.0	35.0	40.0	38	Sticky point
SCT	110	25.0	25.0	19.0	20.0	24.0	24	Sticky point
SCT	155	57.0	47.0	31.0	NA	NA	NA	Sticky point

Table for Cotton B

Meth	LabID	R1	R2	R3	R4	R5	R6	Un
Carameliza	115	1.3	0.0	0.0	1.3	0	0	Color degree
Carameliza	135	2.2	NA	NA	NA	NA	NA	Color degree
Carameliza	140	2.9	NA	NA	NA	NA	NA	Color degree
Carameliza	145	3.1	3.2	NA	NA	NA	NA	Color degree
Carameliza	150	1.8	NA	NA	NA	NA	NA	Color degree
Clinitest	10	0.5	0.0	0.0	NA	NA	NA	Color chart
Contest-Fi	20	466.0	411.0	394.0	406.0	379	NA	C/F Grade
Contest-Fi	75	357.0	290.0	283.0	407.0	329	223	C/F Grade
Contest-Fi	85	306.0	264.0	315.0	183.0	180	332	C/F Grade
Contest-Fi	90	316.0	254.0	294.0	337.0	248	297	C/F Grade
H2SD	35	28.0	34.0	49.0	45.0	29	23	Sticky point
H2SD	80	23.0	31.0	23.0	32.0	22	NA	Sticky point
H2SD	120	29.0	31.0	33.0	27.0	12	12	Sticky point
H2SD	125	37.0	40.0	26.0	31.0	42	38	Sticky point
HSI-NIR	130	29.0	36.0	34.0	31.0	37	32	Sticky point
KOTITI	65	8.0	8.0	8.0	8.0	8	8	KOTITI Grade
Minicard	25	0.8	2.5	1.8	NA	NA	NA	ITMF grade
Minicard	50	1.0	1.0	1.0	NA	NA	NA	ITMF grade
Minicard	105	3.0	3.0	3.0	3.0	3	3	ITMF grade
Qualitativ	95	1.0	1.0	1.0	1.0	1	1	Grade
Quantitati	100	0.3	0.4	0.5	0.4	NA	NA	Percent
Reactive S	15	1.0	0.5	0.0	NA	NA	NA	Spray Grade
SCT	5	60.0	56.0	69.0	NA	NA	NA	Sticky point
SCT	30	24.0	27.0	29.0	27.0	22	17	Sticky point
SCT	40	77.0	79.0	72.0	67.0	64	72	Sticky point
SCT	45	3.0	7.0	4.0	NA	NA	NA	Sticky point
SCT	55	52.0	79.0	59.0	NA	NA	NA	Sticky point
SCT	60	57.0	54.0	31.0	38.0	35	33	Sticky point
SCT	70	30.0	28.0	27.0	29.0	25	24	Sticky point
SCT	110	24.0	23.0	29.0	24.0	21	18	Sticky point
SCT	155	47.0	51.0	42.0	NA	NA	NA	Sticky point

Table for Cotton C

Meth	LabID	R1	R2	R3	R4	R5	R6	Un
Carameliza	115	1.3	1.3	1.3	1.3	1.3	1.3	Color degree
Carameliza	135	3.2	NA	NA	NA	NA	NA	Color degree
Carameliza	140	4.9	NA	NA	NA	NA	NA	Color degree
Carameliza	145	3.3	4.5	NA	NA	NA	NA	Color degree
Carameliza	150	2.7	NA	NA	NA	NA	NA	Color degree
Clinitest	10	0.0	0.0	0.0	NA	NA	NA	Color chart
Contest-Fi	20	96.0	49.0	41.0	28.0	28.0	NA	C/F Grade
Contest-Fi	75	19.0	33.0	35.0	25.0	22.0	22.0	C/F Grade
Contest-Fi	85	19.0	29.0	26.0	55.0	75.0	45.0	C/F Grade
Contest-Fi	90	78.0	84.0	146.0	106.0	41.0	49.0	C/F Grade
H2SD	35	37.0	25.0	23.0	34.0	25.0	22.0	Sticky point
H2SD	80	4.0	1.0	2.0	4.0	3.0	NA	Sticky point
H2SD	120	2.0	3.0	1.0	0.0	1.0	3.0	Sticky point
H2SD	125	3.0	1.0	2.0	2.0	2.0	1.0	Sticky point
HSI-NIR	130	17.0	17.0	16.0	16.0	19.0	21.0	Sticky point
KOTITI	65	4.0	4.0	5.0	4.0	4.0	5.0	KOTITI Grade
Minicard	25	0.0	0.2	0.0	NA	NA	NA	ITMF grade
Minicard	50	1.0	1.0	0.0	NA	NA	NA	ITMF grade
Minicard	105	1.0	1.0	1.0	1.0	1.0	1.0	ITMF grade
Qualitativ	95	1.0	1.0	1.0	1.0	1.0	1.0	Grade
Quantitati	100	0.4	0.4	0.5	0.4	NA	NA	Percent
Reactive S	15	0.0	0.0	0.5	NA	NA	NA	Spray Grade
SCT	5	17.0	22.0	18.0	NA	NA	NA	Sticky point
SCT	30	2.0	2.0	1.0	0.0	4.0	4.0	Sticky point
SCT	40	12.0	10.0	7.0	9.0	7.0	8.0	Sticky point
SCT	45	3.0	4.0	2.0	NA	NA	NA	Sticky point
SCT	55	10.0	10.0	4.0	NA	NA	NA	Sticky point
SCT	60	3.0	2.0	5.0	7.0	3.0	3.0	Sticky point
SCT	70	11.0	15.0	11.0	18.0	16.0	14.0	Sticky point
SCT	110	5.0	4.0	3.0	3.0	2.0	5.0	Sticky point
SCT	155	19.0	8.0	10.0	NA	NA	NA	Sticky point

Table for Cotton D

Meth	LabID	R1	R2	R3	R4	R5	R6	Un
Carameliza	115	1.3	1.3	2.0	1.3	1.3	1.3	Color degree
Carameliza	135	2.1	NA	NA	NA	NA	NA	Color degree
Carameliza	140	3.3	NA	NA	NA	NA	NA	Color degree
Carameliza	145	2.7	2.5	NA	NA	NA	NA	Color degree
Carameliza	150	1.9	NA	NA	NA	NA	NA	Color degree
Clinitest	10	2.0	2.5	2.0	NA	NA	NA	Color chart
Contest-Fi	20	343.0	177.0	143.0	265.0	142.0	NA	C/F Grade
Contest-Fi	75	77.0	111.0	119.0	82.0	63.0	91.0	C/F Grade
Contest-Fi	85	52.0	91.0	62.0	75.0	73.0	30.0	C/F Grade
Contest-Fi	90	218.0	69.0	117.0	72.0	135.0	102.0	C/F Grade
H2SD	35	2.0	21.0	24.0	31.0	24.0	13.0	Sticky point
H2SD	80	1.0	0.0	0.0	2.0	0.0	NA	Sticky point
H2SD	120	8.0	3.0	6.0	4.0	10.0	10.0	Sticky point
H2SD	125	3.0	4.0	2.0	3.0	3.0	4.0	Sticky point
HSI-NIR	130	8.0	16.0	11.0	16.0	13.0	14.0	Sticky point
KOTITI	65	8.0	8.0	8.0	8.0	8.0	8.0	KOTITI Grade
Minicard	25	1.5	2.5	1.8	NA	NA	NA	ITMF grade
Minicard	50	1.0	2.0	2.0	NA	NA	NA	ITMF grade
Minicard	105	1.0	1.0	1.0	1.0	1.0	1.0	ITMF grade
Qualitativ	95	1.0	1.0	1.0	1.0	1.0	1.0	Grade
Quantitati	100	0.6	0.4	0.4	0.5	NA	NA	Percent
Reactive S	15	2.5	2.0	2.0	NA	NA	NA	Spray Grade
SCT	5	10.0	15.0	19.0	NA	NA	NA	Sticky point
SCT	30	2.0	3.0	4.0	2.0	3.0	2.0	Sticky point
SCT	40	7.0	6.0	8.0	5.0	4.0	9.0	Sticky point
SCT	45	7.0	10.0	1.0	NA	NA	NA	Sticky point
SCT	55	2.0	2.0	5.0	NA	NA	NA	Sticky point
SCT	60	3.0	2.0	3.0	6.0	3.0	8.0	Sticky point
SCT	70	9.0	13.0	10.0	9.0	11.0	12.0	Sticky point
SCT	110	2.0	1.0	8.0	4.0	2.0	3.0	Sticky point
SCT	155	29.0	12.0	13.0	NA	NA	NA	Sticky point

Table for Cotton E

Meth	LabID	R1	R2	R3	R4	R5	R6	Un
Carameliza	115	5.0	4.0	5.0	4.0	5	4	Color degree
Carameliza	135	2.3	NA	NA	NA	NA	NA	Color degree
Carameliza	140	4.9	NA	NA	NA	NA	NA	Color degree
Carameliza	145	3.2	3.4	NA	NA	NA	NA	Color degree
Carameliza	150	1.9	NA	NA	NA	NA	NA	Color degree
Clinitest	10	7.0	7.0	6.0	NA	NA	NA	Color chart
Contest-Fi	20	586.0	332.0	544.0	455.0	434	NA	C/F Grade
Contest-Fi	75	602.0	494.0	560.0	659.0	666	455	C/F Grade
Contest-Fi	85	615.0	473.0	467.0	350.0	361	608	C/F Grade
Contest-Fi	90	481.0	294.0	312.0	431.0	386	475	C/F Grade
H2SD	35	24.0	31.0	22.0	35.0	35	52	Sticky point
H2SD	80	27.0	35.0	34.0	34.0	38	NA	Sticky point
H2SD	120	34.0	35.0	55.0	35.0	38	38	Sticky point
H2SD	125	62.0	52.0	70.0	66.0	64	59	Sticky point
HSI-NIR	130	39.0	36.0	43.0	38.0	36	40	Sticky point
KOTITI	65	8.0	8.0	8.0	8.0	8	8	KOTITI Grade
Minicard	25	3.0	2.0	2.8	NA	NA	NA	ITMF grade
Minicard	50	1.0	0.0	1.0	NA	NA	NA	ITMF grade
Minicard	105	3.0	3.0	3.0	3.0	3	3	ITMF grade
Qualitativ	95	2.0	2.0	2.0	2.0	2	2	Grade
Quantitati	100	0.8	0.9	0.9	0.9	NA	NA	Percent
Reactive S	15	8.0	7.0	7.0	NA	NA	NA	Spray Grade
SCT	5	77.0	82.0	106.0	NA	NA	NA	Sticky point
SCT	30	38.0	64.0	64.0	55.0	22	104	Sticky point
SCT	40	93.0	107.0	106.0	92.0	109	98	Sticky point
SCT	45	3.0	0.0	0.0	NA	NA	NA	Sticky point
SCT	55	109.0	259.0	206.0	NA	NA	NA	Sticky point
SCT	60	54.0	47.0	47.0	62.0	49	55	Sticky point
SCT	70	126.0	103.0	101.0	100.0	109	110	Sticky point
SCT	110	31.0	28.0	31.0	42.0	28	26	Sticky point
SCT	155	116.0	93.0	133.0	NA	NA	NA	Sticky point

Statistics per Method, LabID for each cottons [2]

[2]Footnote

* Mean of all readings per LabID (NA excluded, expressed in Unit).
* Var = variance taking care of all available readings per LabID (NA excluded).
* CV = CV between reading per LabID expressed in percent.
* GMean = Grand Mean of all laboratory means, calculated by Method.
* Delta = LabID Mean - GMean.
* NA or NaN : no result provided.

Table for Cotton A

Meth	LabID	MeanIntraLab	Un	VarIntraLab	CVIntraLab	MeanInterLab	Delta
Carameliza	115	1.9	Color degree	0.1	15.2	2.5	-0.6
Carameliza	135	1.4	Color degree	NA	NA	2.5	-1.1
Carameliza	140	4.3	Color degree	NA	NA	2.5	1.8
Carameliza	145	2.8	Color degree	0.2	17.4	2.5	0.3
Carameliza	150	2.1	Color degree	NA	NA	2.5	-0.4
Clinitest	10	1.2	Color chart	0.1	24.7	1.2	0.0
Contest-Fi	20	306.6	C/F Grade	1463.8	12.5	254.6	52.0
Contest-Fi	75	191.0	C/F Grade	2537.2	26.4	254.6	-63.6
Contest-Fi	85	254.7	C/F Grade	4112.7	25.2	254.6	0.1
Contest-Fi	90	266.2	C/F Grade	439.0	7.9	254.6	11.6
H2SD	35	55.5	Sticky point	598.7	44.1	31.1	24.4
H2SD	80	18.2	Sticky point	64.7	44.2	31.1	-12.9
H2SD	120	30.2	Sticky point	149.0	40.5	31.1	-0.9
H2SD	125	20.3	Sticky point	15.9	19.6	31.1	-10.7
HSI-NIR	130	40.0	Sticky point	3.6	4.7	40.0	0.0
KOTITI	65	8.3	KOTITI Grade	0.3	6.2	8.3	0.0
Minicard	25	1.8	ITMF grade	0.4	37.8	1.7	0.1
Minicard	50	0.3	ITMF grade	0.3	173.2	1.7	-1.4
Minicard	105	3.0	ITMF grade	0.0	0.0	1.7	1.3
Qualitativ	95	2.0	Grade	0.0	0.0	2.0	0.0
Quantitati	100	0.5	Percent	0.0	9.0	0.5	0.0
Reactive S	15	1.3	Spray Grade	0.1	21.7	1.3	0.0
SCT	5	43.7	Sticky point	16.3	9.3	30.1	13.6
SCT	30	21.5	Sticky point	33.1	26.8	30.1	-8.6
SCT	40	36.5	Sticky point	11.9	9.5	30.1	6.4
SCT	45	0.7	Sticky point	1.3	173.2	30.1	-29.4
SCT	55	32.0	Sticky point	67.0	25.6	30.1	1.9
SCT	60	31.2	Sticky point	31.8	18.1	30.1	1.1
SCT	70	37.2	Sticky point	7.8	7.5	30.1	7.1
SCT	110	22.8	Sticky point	7.0	11.6	30.1	-7.2
SCT	155	45.0	Sticky point	172.0	29.1	30.1	14.9

Table for Cotton B

Meth	LabID	MeanIntraLab	Un	VarIntraLab	CVIntraLab	MeanInterLab	Delta
Carameliza	115	0.4	Color degree	0.5	154.9	2.1	-1.7
Carameliza	135	2.2	Color degree	NA	NA	2.1	0.1
Carameliza	140	2.9	Color degree	NA	NA	2.1	0.8
Carameliza	145	3.2	Color degree	0.0	2.2	2.1	1.1
Carameliza	150	1.8	Color degree	NA	NA	2.1	-0.3
Clinitest	10	0.2	Color chart	0.1	173.2	0.2	0.0
Contest-Fi	20	411.2	C/F Grade	1090.7	8.0	320.1	91.1
Contest-Fi	75	314.8	C/F Grade	4107.4	20.4	320.1	-5.3
Contest-Fi	85	263.3	C/F Grade	4520.7	25.5	320.1	-56.8
Contest-Fi	90	291.0	C/F Grade	1200.8	11.9	320.1	-29.1
H2SD	35	34.7	Sticky point	105.1	29.6	30.1	4.5
H2SD	80	26.2	Sticky point	23.7	18.6	30.1	-3.9
H2SD	120	24.0	Sticky point	90.4	39.6	30.1	-6.1
H2SD	125	35.7	Sticky point	36.3	16.9	30.1	5.5
HSI-NIR	130	33.2	Sticky point	9.4	9.2	33.2	0.0
KOTITI	65	8.0	KOTITI Grade	0.0	0.0	8.0	0.0
Minicard	25	1.7	ITMF grade	0.8	52.7	1.9	-0.2
Minicard	50	1.0	ITMF grade	0.0	0.0	1.9	-0.9
Minicard	105	3.0	ITMF grade	0.0	0.0	1.9	1.1
Qualitativ	95	1.0	Grade	0.0	0.0	1.0	0.0
Quantitati	100	0.4	Percent	0.0	16.7	0.4	0.0
Reactive S	15	0.5	Spray Grade	0.2	100.0	0.5	0.0
SCT	5	61.7	Sticky point	44.3	10.8	40.5	21.2
SCT	30	24.3	Sticky point	19.1	17.9	40.5	-16.1
SCT	40	71.8	Sticky point	32.6	7.9	40.5	31.4
SCT	45	4.7	Sticky point	4.3	44.6	40.5	-35.8
SCT	55	63.3	Sticky point	196.3	22.1	40.5	22.9
SCT	60	41.3	Sticky point	126.7	27.2	40.5	0.9
SCT	70	27.2	Sticky point	5.4	8.5	40.5	-13.3
SCT	110	23.2	Sticky point	13.4	15.8	40.5	-17.3
SCT	155	46.7	Sticky point	20.3	9.7	40.5	6.2

Table for Cotton C

Meth	LabID	MeanIntraLab	Un	VarIntraLab	CVIntraLab	MeanInterLab	Delta
Carameliza	115	1.3	Color degree	0.0	0.0	3.2	-1.9
Carameliza	135	3.2	Color degree	NA	NA	3.2	0.0
Carameliza	140	4.9	Color degree	NA	NA	3.2	1.7
Carameliza	145	3.9	Color degree	0.7	21.8	3.2	0.7
Carameliza	150	2.7	Color degree	NA	NA	3.2	-0.5
Clinitest	10	0.0	Color chart	0.0	NaN	0.0	0.0
Contest-Fi	20	48.4	C/F Grade	788.3	58.0	50.0	-1.6
Contest-Fi	75	26.0	C/F Grade	42.4	25.0	50.0	-24.0
Contest-Fi	85	41.5	C/F Grade	443.9	50.8	50.0	-8.5
Contest-Fi	90	84.0	C/F Grade	1487.6	45.9	50.0	34.0
H2SD	35	27.7	Sticky point	39.1	22.6	8.5	19.2
H2SD	80	2.8	Sticky point	1.7	46.6	8.5	-5.7
H2SD	120	1.7	Sticky point	1.5	72.7	8.5	-6.8
H2SD	125	1.8	Sticky point	0.6	41.1	8.5	-6.7
HSI-NIR	130	17.7	Sticky point	3.9	11.1	17.7	0.0
KOTITI	65	4.3	KOTITI Grade	0.3	11.9	4.3	0.0
Minicard	25	0.1	ITMF grade	0.0	173.2	0.6	-0.5
Minicard	50	0.7	ITMF grade	0.3	86.6	0.6	0.1
Minicard	105	1.0	ITMF grade	0.0	0.0	0.6	0.4
Qualitativ	95	1.0	Grade	0.0	0.0	1.0	0.0
Quantitati	100	0.4	Percent	0.0	11.7	0.4	0.0
Reactive S	15	0.2	Spray Grade	0.1	173.2	0.2	0.0
SCT	5	19.0	Sticky point	7.0	13.9	8.3	10.7
SCT	30	2.2	Sticky point	2.6	73.9	8.3	-6.2
SCT	40	8.8	Sticky point	3.8	22.0	8.3	0.5
SCT	45	3.0	Sticky point	1.0	33.3	8.3	-5.3
SCT	55	8.0	Sticky point	12.0	43.3	8.3	-0.3
SCT	60	3.8	Sticky point	3.4	47.9	8.3	-4.5
SCT	70	14.2	Sticky point	7.8	19.7	8.3	5.8
SCT	110	3.7	Sticky point	1.5	33.0	8.3	-4.7
SCT	155	12.3	Sticky point	34.3	47.5	8.3	4.0

Table for Cotton D

Meth	LabID	MeanIntraLab	Un	VarIntraLab	CVIntraLab	MeanInterLab	Delta
Carameliza	115	1.4	Color degree	0.1	20.2	2.3	-0.8
Carameliza	135	2.1	Color degree	NA	NA	2.3	-0.2
Carameliza	140	3.3	Color degree	NA	NA	2.3	1.0
Carameliza	145	2.6	Color degree	0.0	5.4	2.3	0.3
Carameliza	150	1.9	Color degree	NA	NA	2.3	-0.4
Clinitest	10	2.2	Color chart	0.1	13.3	2.2	0.0
Contest-Fi	20	214.0	C/F Grade	7709.0	41.0	121.8	92.2
Contest-Fi	75	90.5	C/F Grade	448.7	23.4	121.8	-31.3
Contest-Fi	85	63.8	C/F Grade	447.0	33.1	121.8	-58.0
Contest-Fi	90	118.8	C/F Grade	3011.8	46.2	121.8	-3.0
H2SD	35	19.2	Sticky point	104.6	53.4	7.4	11.7
H2SD	80	0.6	Sticky point	0.8	149.1	7.4	-6.8
H2SD	120	6.8	Sticky point	9.0	43.8	7.4	-0.6
H2SD	125	3.2	Sticky point	0.6	23.8	7.4	-4.3
HSI-NIR	130	13.0	Sticky point	9.6	23.8	13.0	0.0
KOTITI	65	8.0	KOTITI Grade	0.0	0.0	8.0	0.0
Minicard	25	1.9	ITMF grade	0.3	27.2	1.5	0.4
Minicard	50	1.7	ITMF grade	0.3	34.6	1.5	0.1
Minicard	105	1.0	ITMF grade	0.0	0.0	1.5	-0.5
Qualitativ	95	1.0	Grade	0.0	0.0	1.0	0.0
Quantitati	100	0.5	Percent	0.0	13.0	0.5	0.0
Reactive S	15	2.2	Spray Grade	0.1	13.3	2.2	0.0
SCT	5	14.7	Sticky point	20.3	30.7	7.7	7.0
SCT	30	2.7	Sticky point	0.7	30.6	7.7	-5.0
SCT	40	6.5	Sticky point	3.5	28.8	7.7	-1.2
SCT	45	6.0	Sticky point	21.0	76.4	7.7	-1.7
SCT	55	3.0	Sticky point	3.0	57.7	7.7	-4.7
SCT	60	4.2	Sticky point	5.4	55.6	7.7	-3.5
SCT	70	10.7	Sticky point	2.7	15.3	7.7	3.0
SCT	110	3.3	Sticky point	6.3	75.1	7.7	-4.3
SCT	155	18.0	Sticky point	91.0	53.0	7.7	10.3

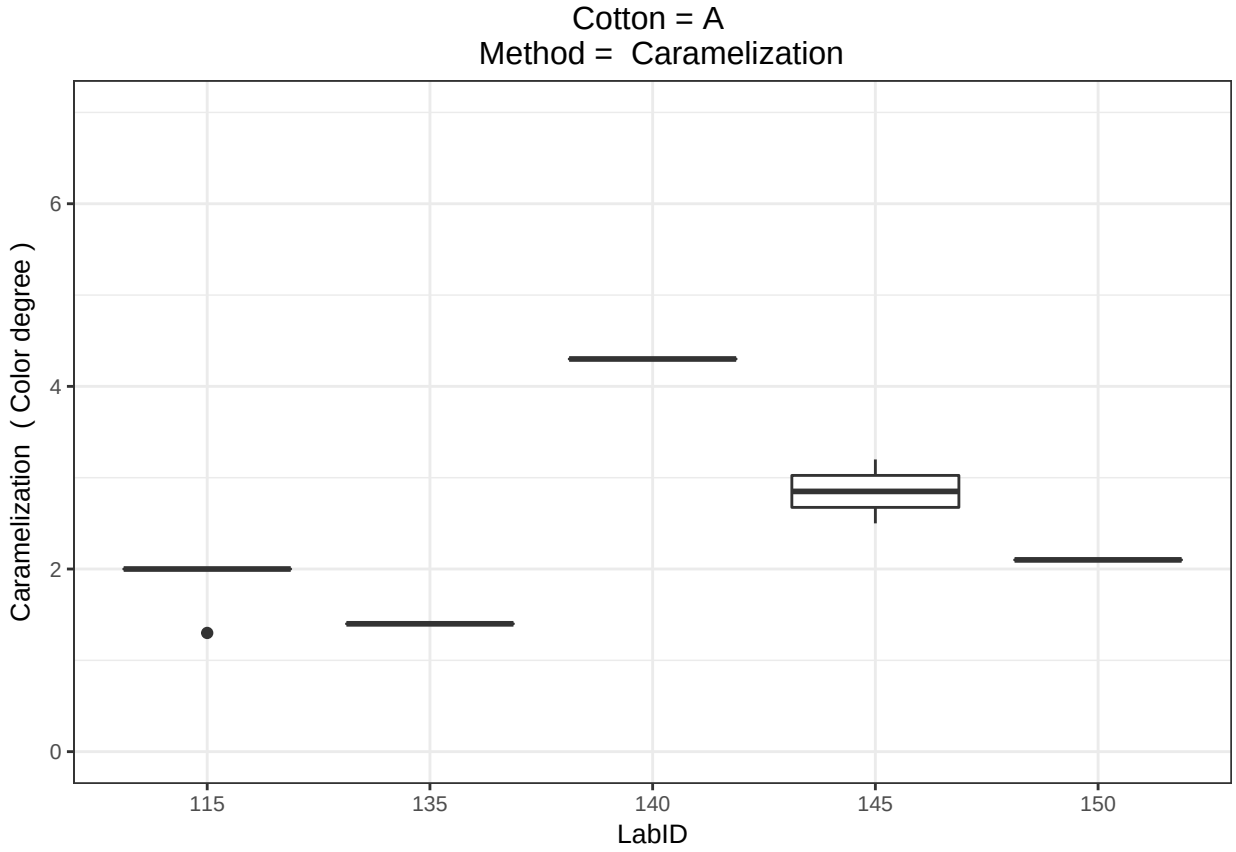
Table for Cotton E

Meth	LabID	MeanIntraLab	Un	VarIntraLab	CVIntraLab	MeanInterLab	Delta
Carameliza	115	4.5	Color degree	0.3	12.2	3.4	1.1
Carameliza	135	2.3	Color degree	NA	NA	3.4	-1.1
Carameliza	140	4.9	Color degree	NA	NA	3.4	1.5
Carameliza	145	3.3	Color degree	0.0	4.3	3.4	-0.1
Carameliza	150	1.9	Color degree	NA	NA	3.4	-1.5
Clinitest	10	6.7	Color chart	0.3	8.7	6.7	0.0
Contest-Fi	20	470.2	C/F Grade	9874.2	21.1	479.6	-9.4
Contest-Fi	75	572.7	C/F Grade	7443.9	15.1	479.6	93.1
Contest-Fi	85	479.0	C/F Grade	13176.4	24.0	479.6	-0.6
Contest-Fi	90	396.5	C/F Grade	6449.9	20.3	479.6	-83.1
H2SD	35	33.2	Sticky point	115.0	32.3	42.0	-8.9
H2SD	80	33.6	Sticky point	16.3	12.0	42.0	-8.4
H2SD	120	39.2	Sticky point	63.0	20.3	42.0	-2.9
H2SD	125	62.2	Sticky point	38.6	10.0	42.0	20.1
HSI-NIR	130	38.7	Sticky point	7.1	6.9	38.7	0.0
KOTITI	65	8.0	KOTITI Grade	0.0	0.0	8.0	0.0
Minicard	25	2.6	ITMF grade	0.3	20.1	2.1	0.5
Minicard	50	0.7	ITMF grade	0.3	86.6	2.1	-1.4
Minicard	105	3.0	ITMF grade	0.0	0.0	2.1	0.9
Qualitativ	95	2.0	Grade	0.0	0.0	2.0	0.0
Quantitati	100	0.9	Percent	0.0	2.3	0.9	0.0
Reactive S	15	7.3	Spray Grade	0.3	7.9	7.3	0.0
SCT	5	88.3	Sticky point	240.3	17.6	82.8	5.6
SCT	30	57.8	Sticky point	778.6	48.2	82.8	-24.9
SCT	40	100.8	Sticky point	55.8	7.4	82.8	18.1
SCT	45	1.0	Sticky point	3.0	173.2	82.8	-81.8
SCT	55	191.3	Sticky point	5786.3	39.8	82.8	108.6
SCT	60	52.3	Sticky point	34.3	11.2	82.8	-30.4
SCT	70	108.2	Sticky point	93.4	8.9	82.8	25.4
SCT	110	31.0	Sticky point	32.8	18.5	82.8	-51.8
SCT	155	114.0	Sticky point	403.0	17.6	82.8	31.2

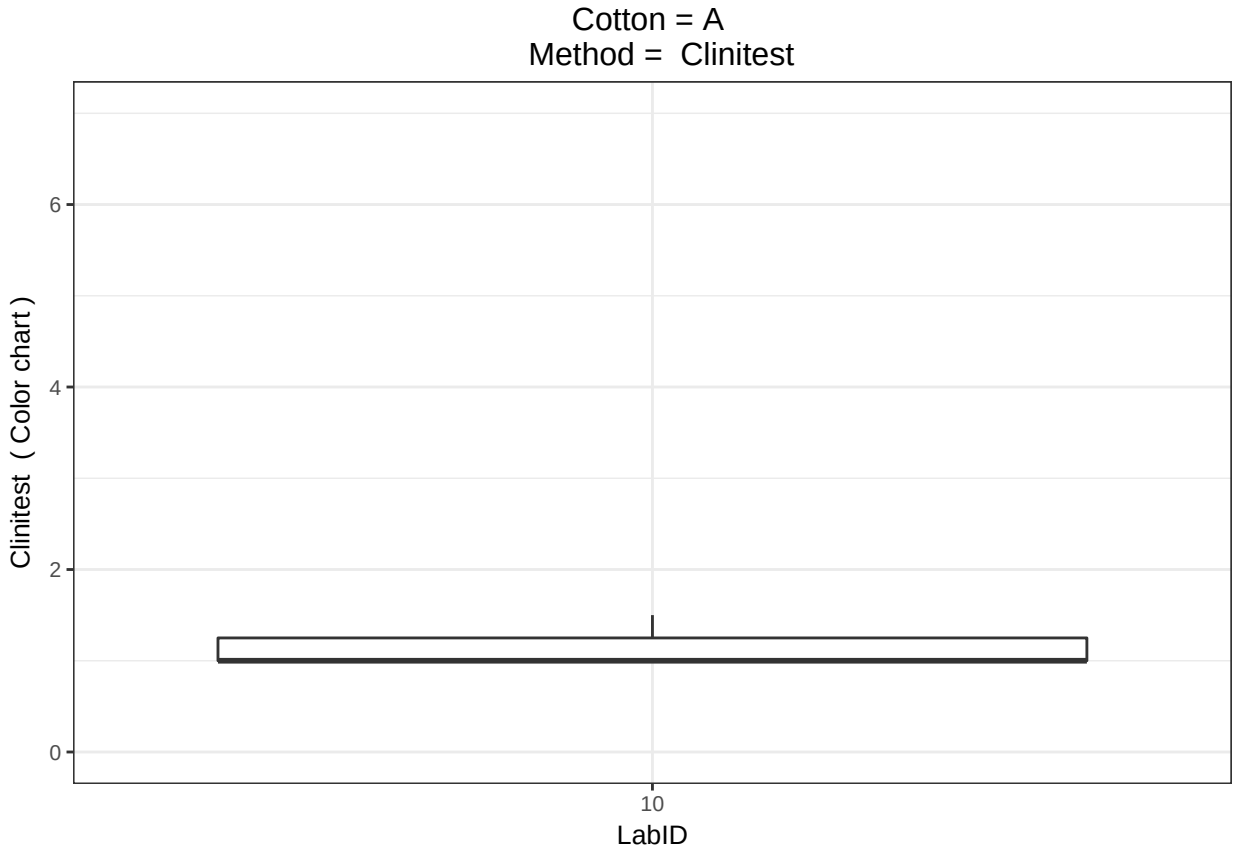
Data presented by boxplots per Method, LabID for each cotton [3]

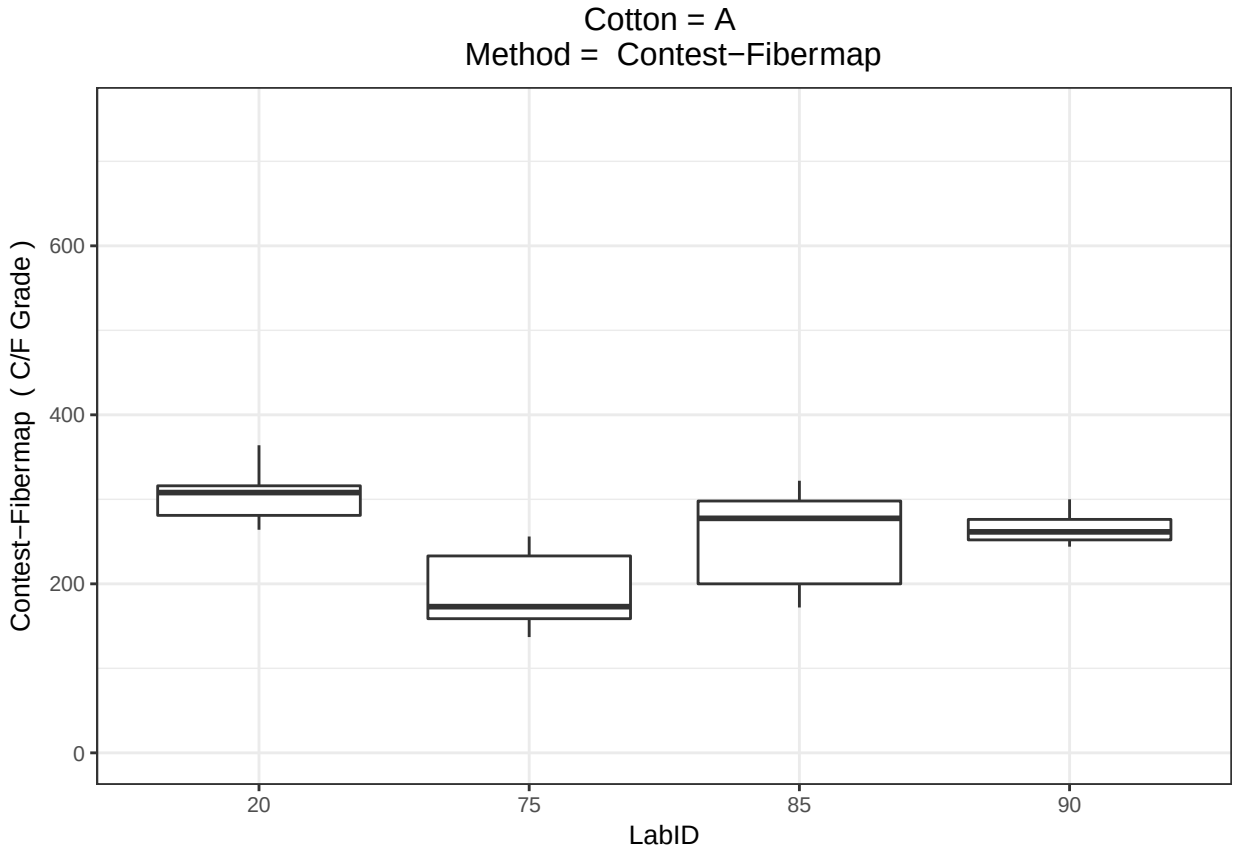
This section is appearing for the last time (RT2019-1) as the same information is given in the next section in a much more concise way; therefore next section only will remain in future reports.

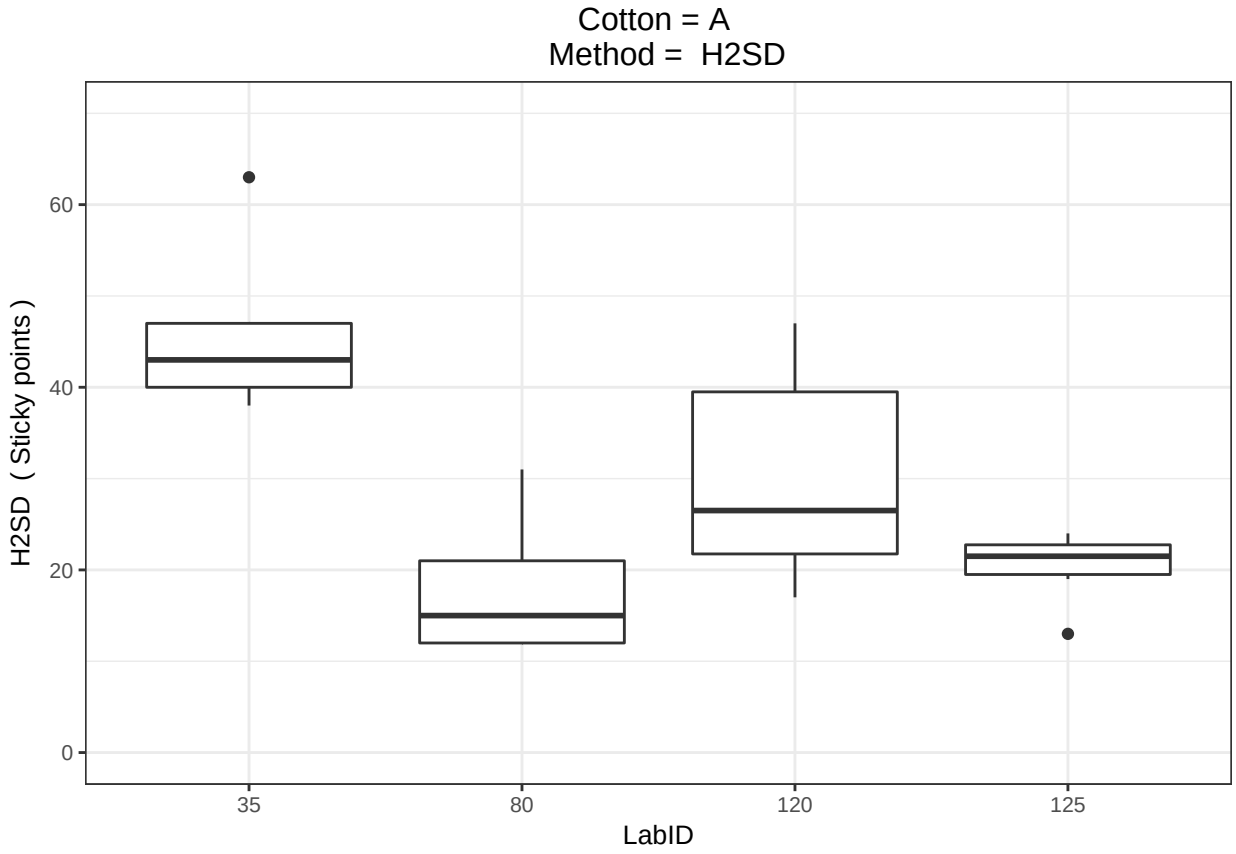
Boxplots for Cotton A

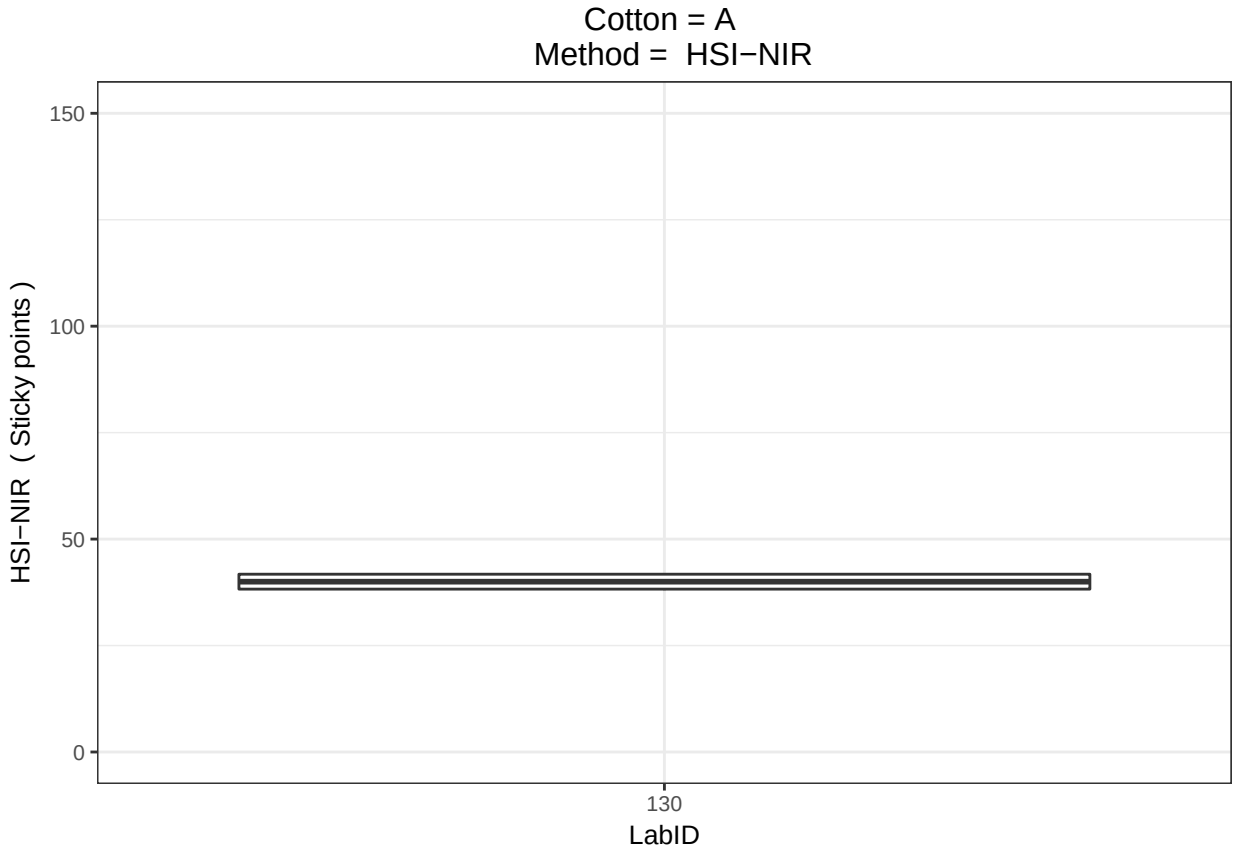


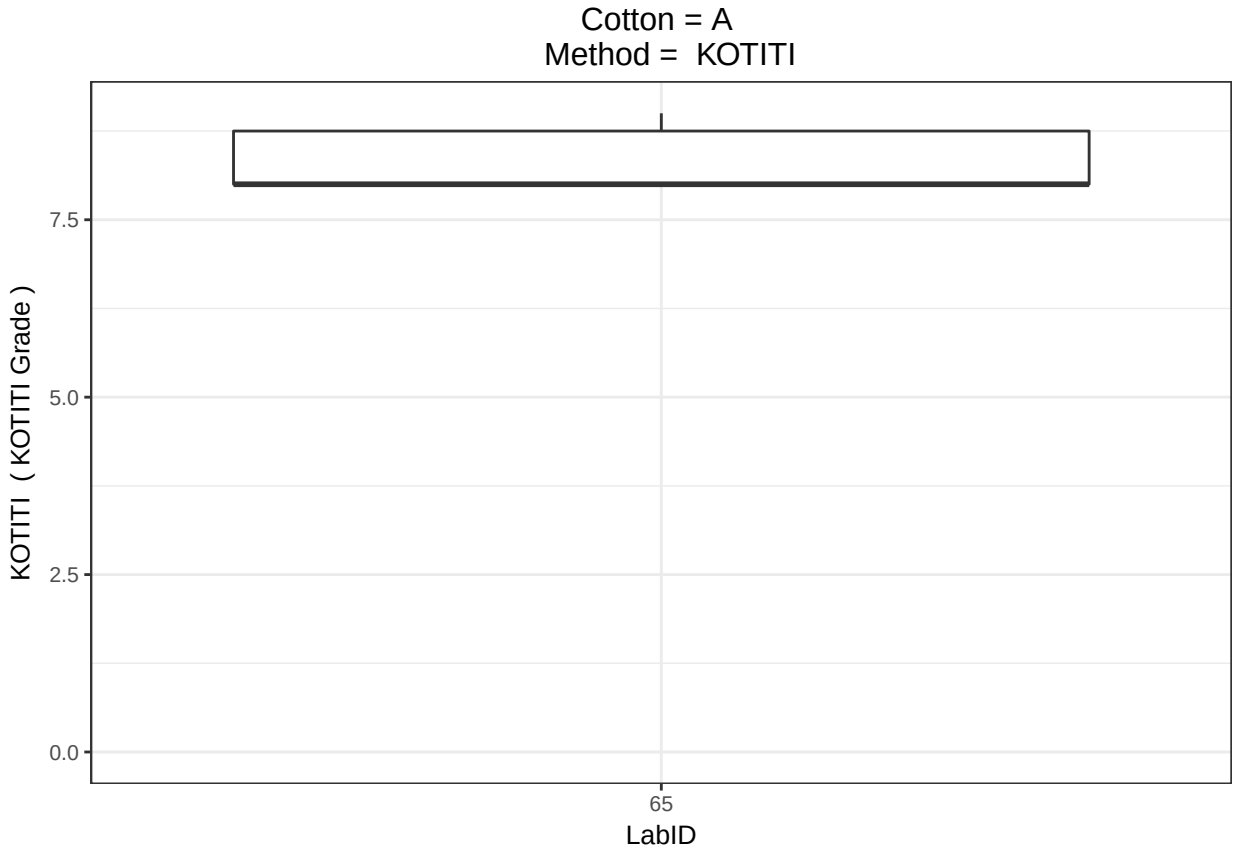
[3]Footnote
* NA excluded.
* In each box, the bolded line represents the median of all individual results for the considered LabID.
* The square represents the upper 75% (Q75) and lower 25% (Q25) percentiles of the individual results.
* The whiskers represent the quantiles that included in +/- 1.5 * (Q75-Q25).
* Extreme points may additionally be displayed by a point further out from the whiskers.

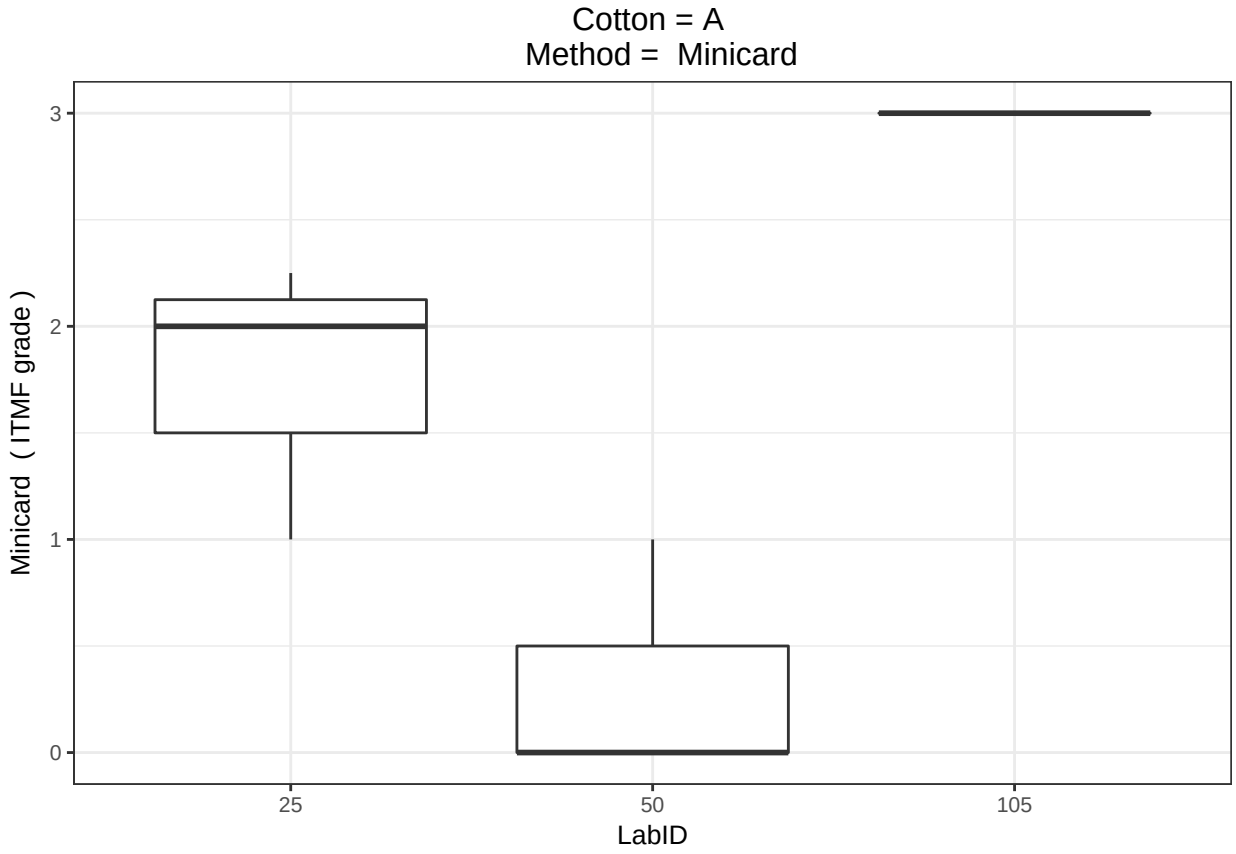

Cotton = A
Method = Clinitest
Clinitest (Color chart)
6
4
2
0
10
LabID

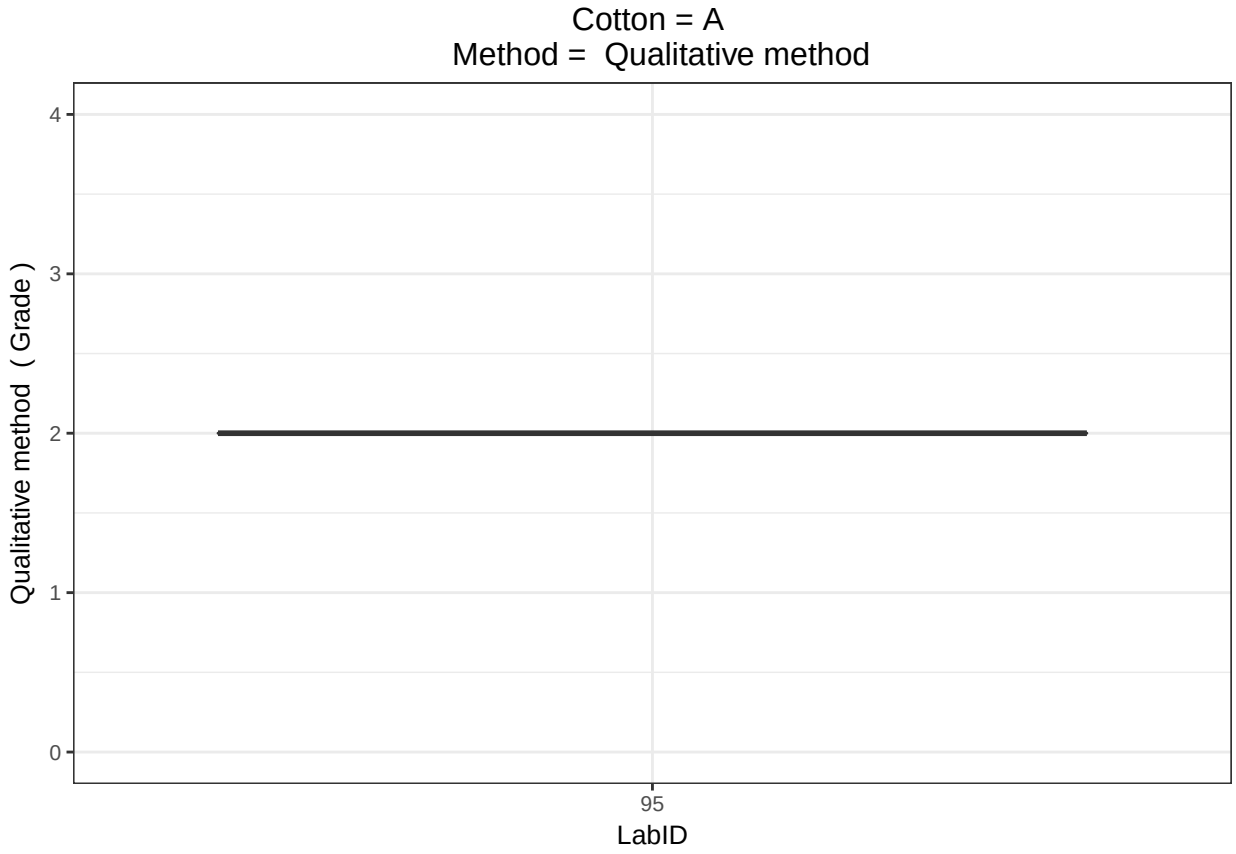

Cotton = A
Method = Contest−Fibermap
Contest−Fibermap (C/F Grade)
600
400
200
0
20
75
85
90
LabID

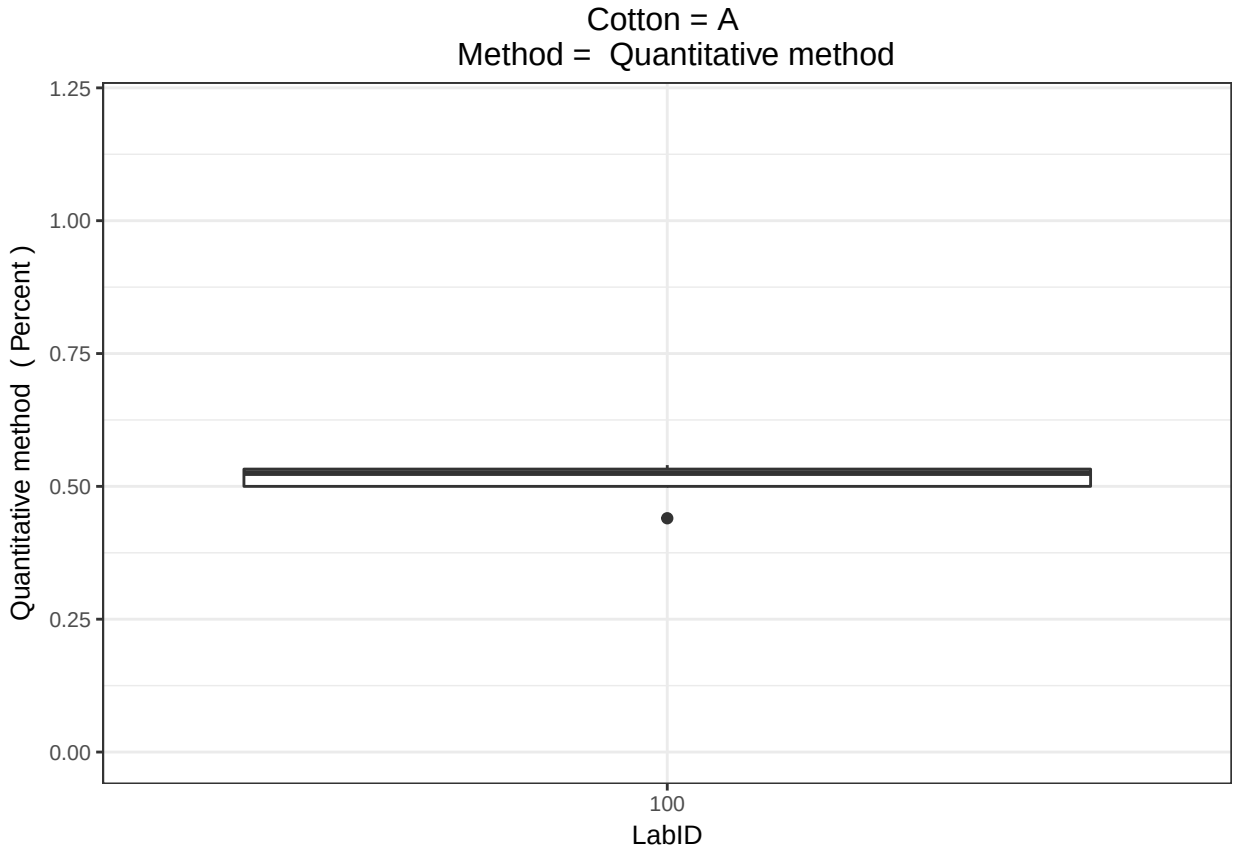

Cotton = A
Method = H2SD
H2SD (Sticky points)
60
40
20
0
35
80
120
125
LabID

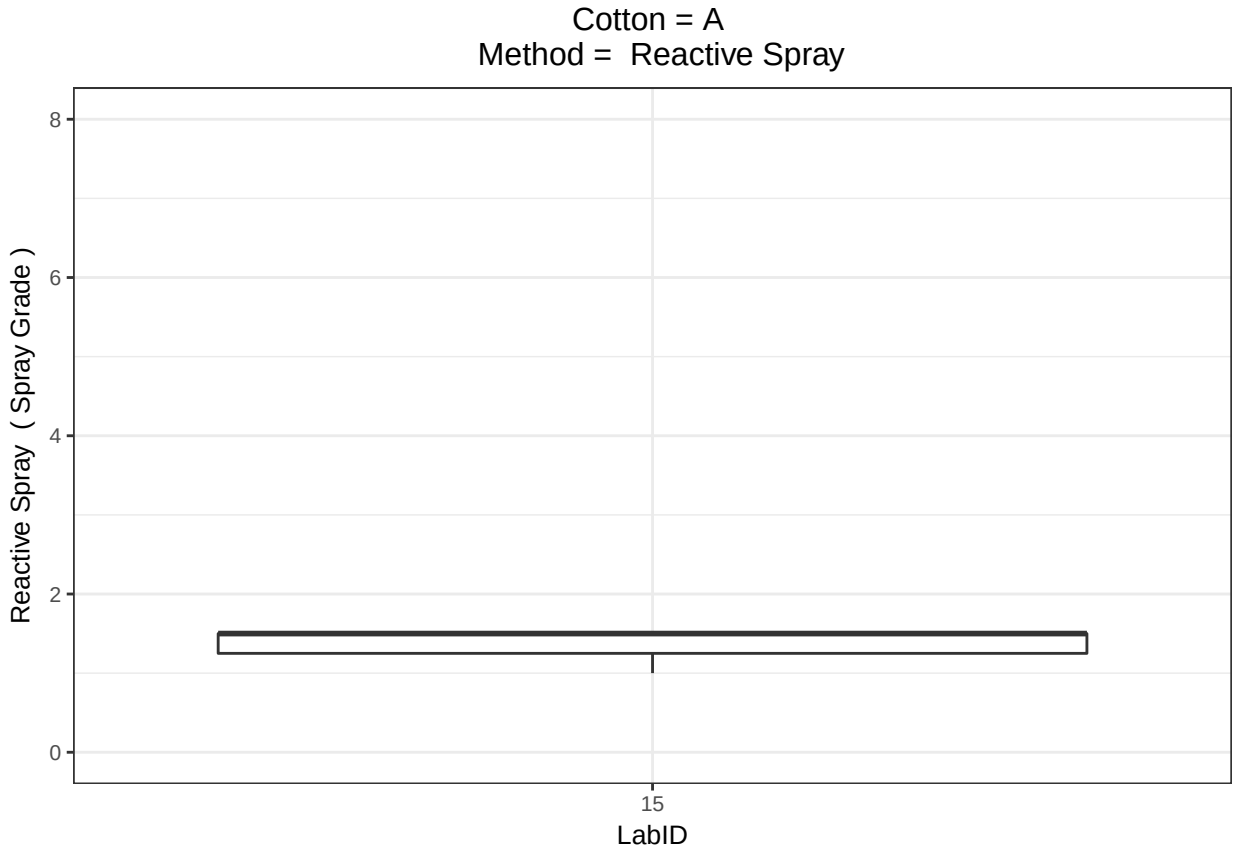

Cotton = A
Method = HSI−NIR
150
100
50
0
HSI−NIR (Sticky points)
130
LabID

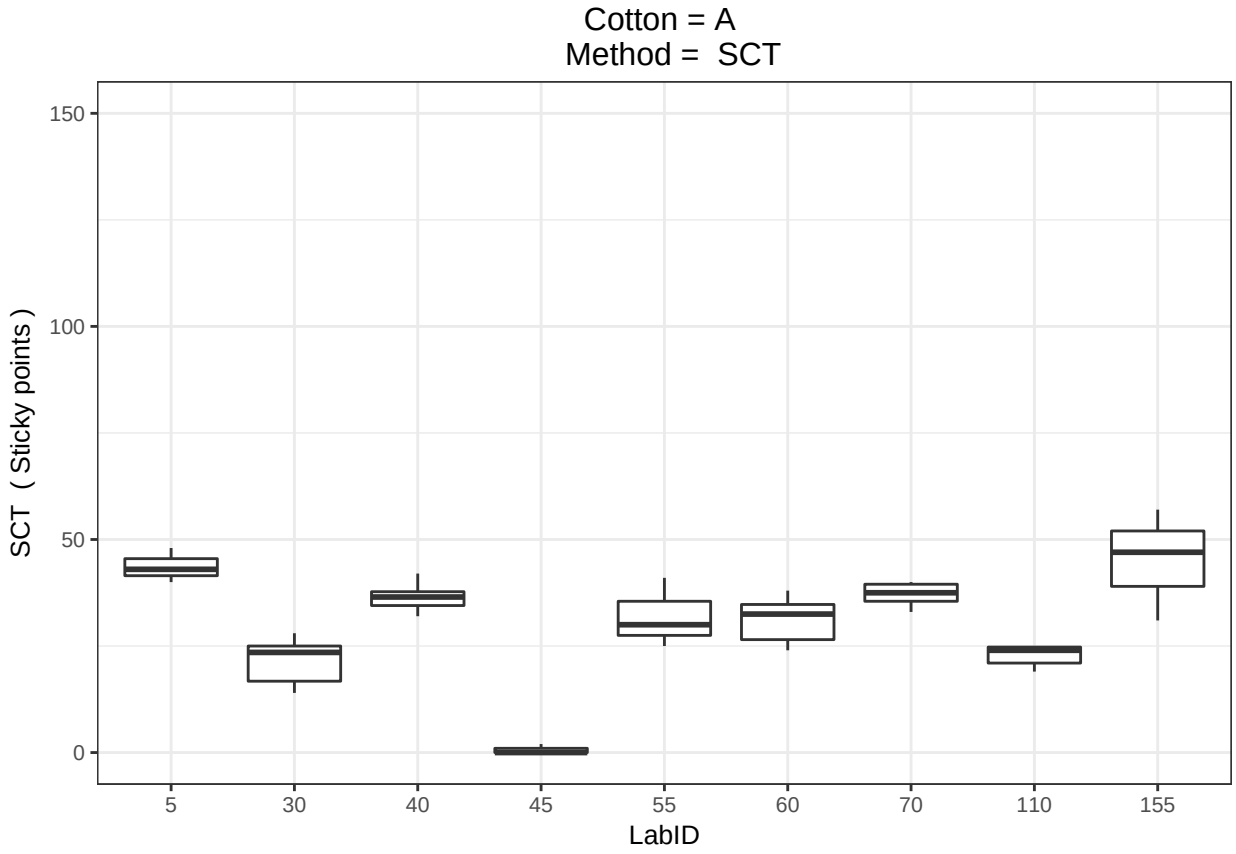

Cotton = A
Method = KOTITI
KOTITI (KOTITI Grade)
7.5
5.0
2.5
0.0
65
LabID


Cotton = A
Method = Minicard
Minicard (ITMF grade)
3
2
1
0
25
50
105
LabID

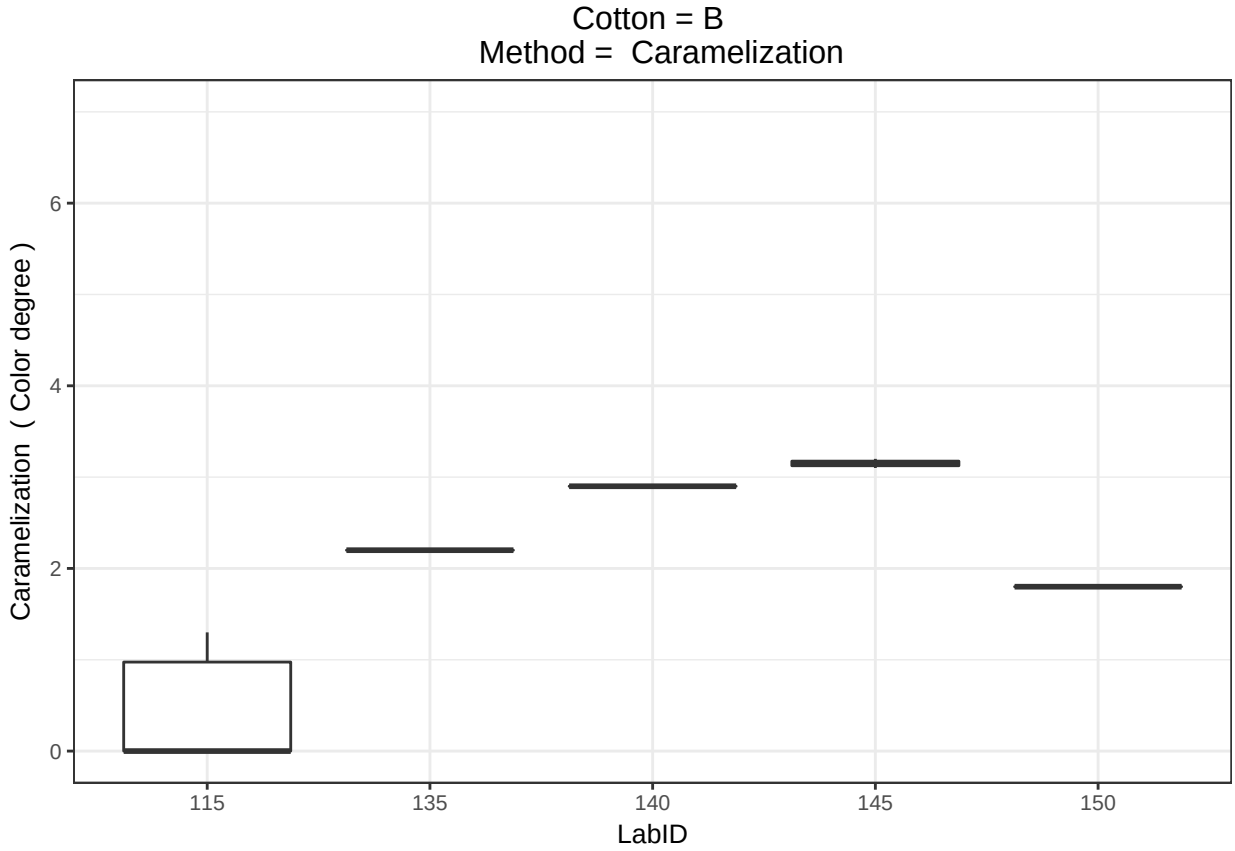

Cotton = A
Method = Qualitative method
Qualitative method (Grade)
4
3
2
1
0
95
LabID

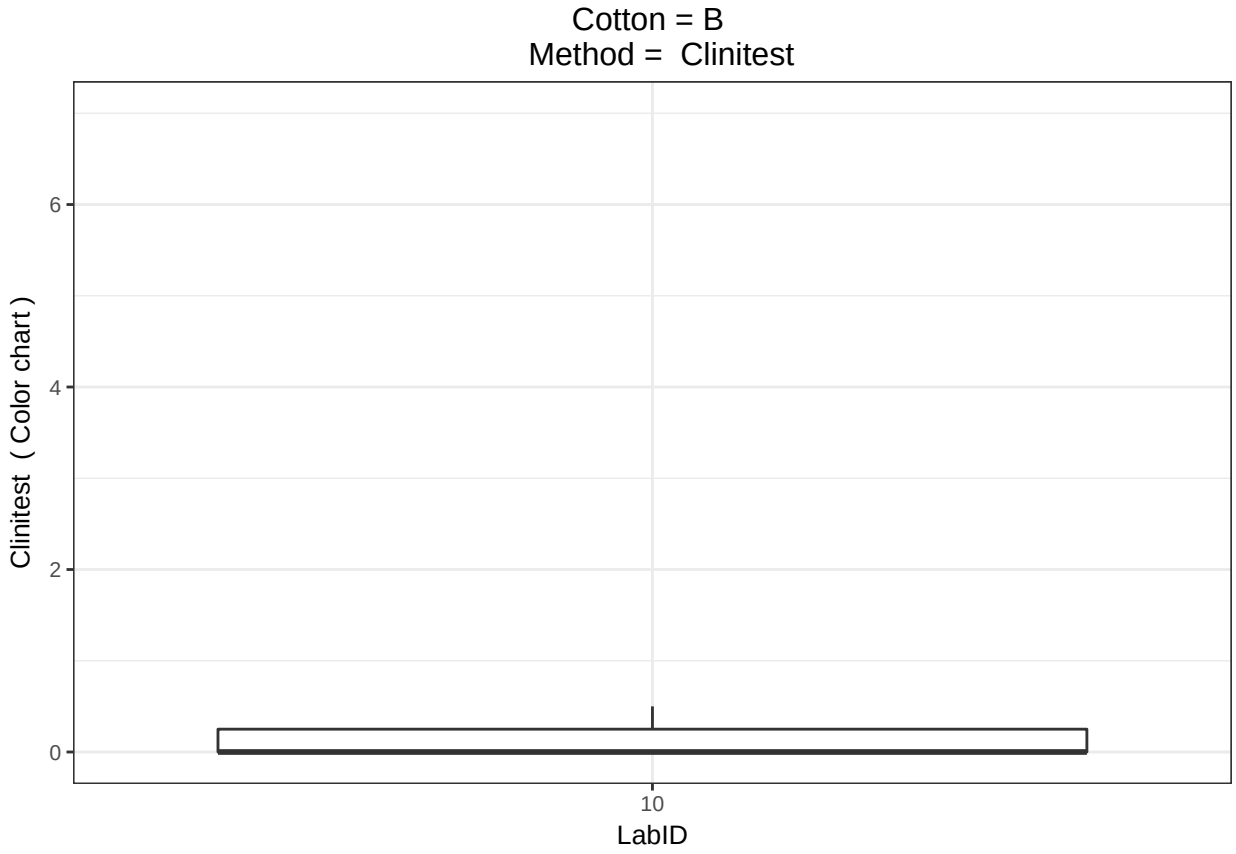

Cotton = A
Method = Quantitative method
Quantitative method (Percent)
1.25
1.00
0.75
0.50
0.25
0.00
100
LabID

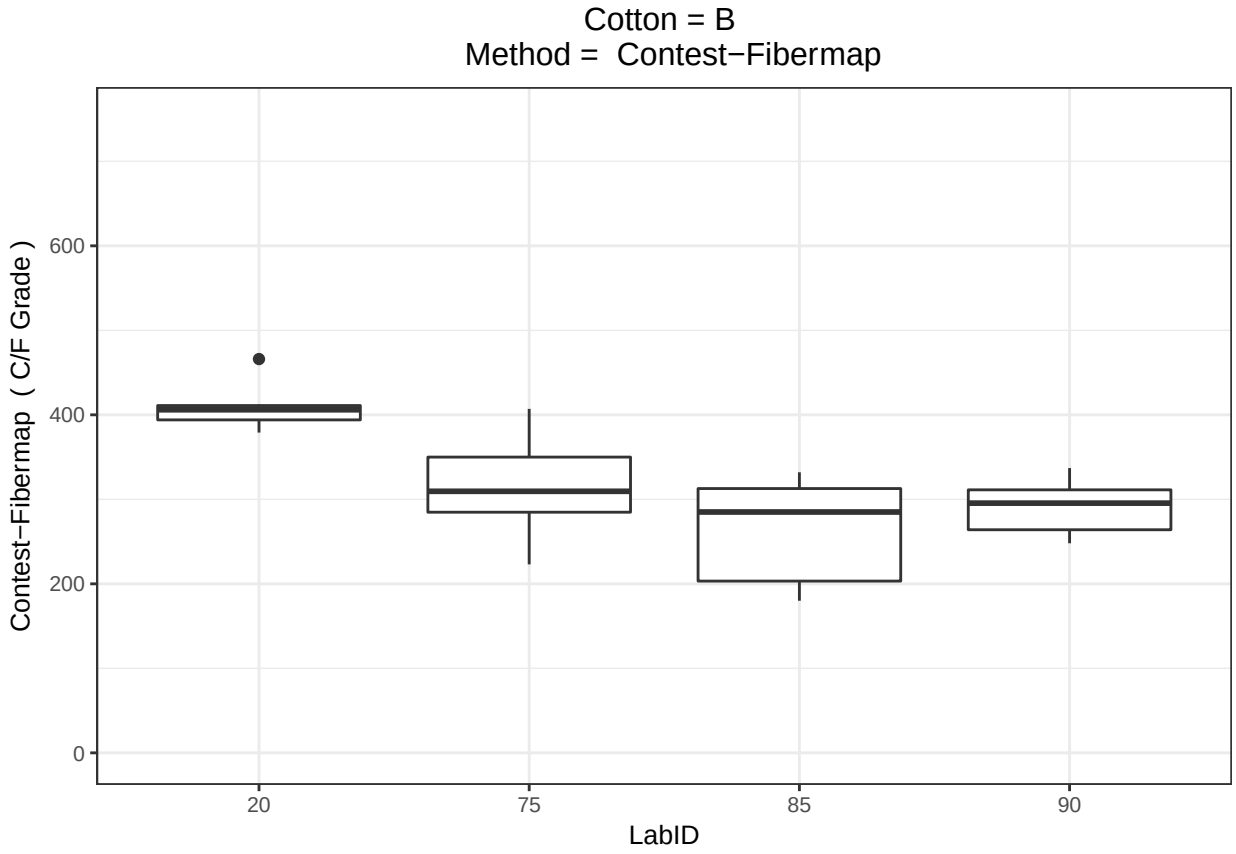

Cotton = A
Method = Reactive Spray
Reactive Spray (Spray Grade)
8
6
4
2
0
15
LabID

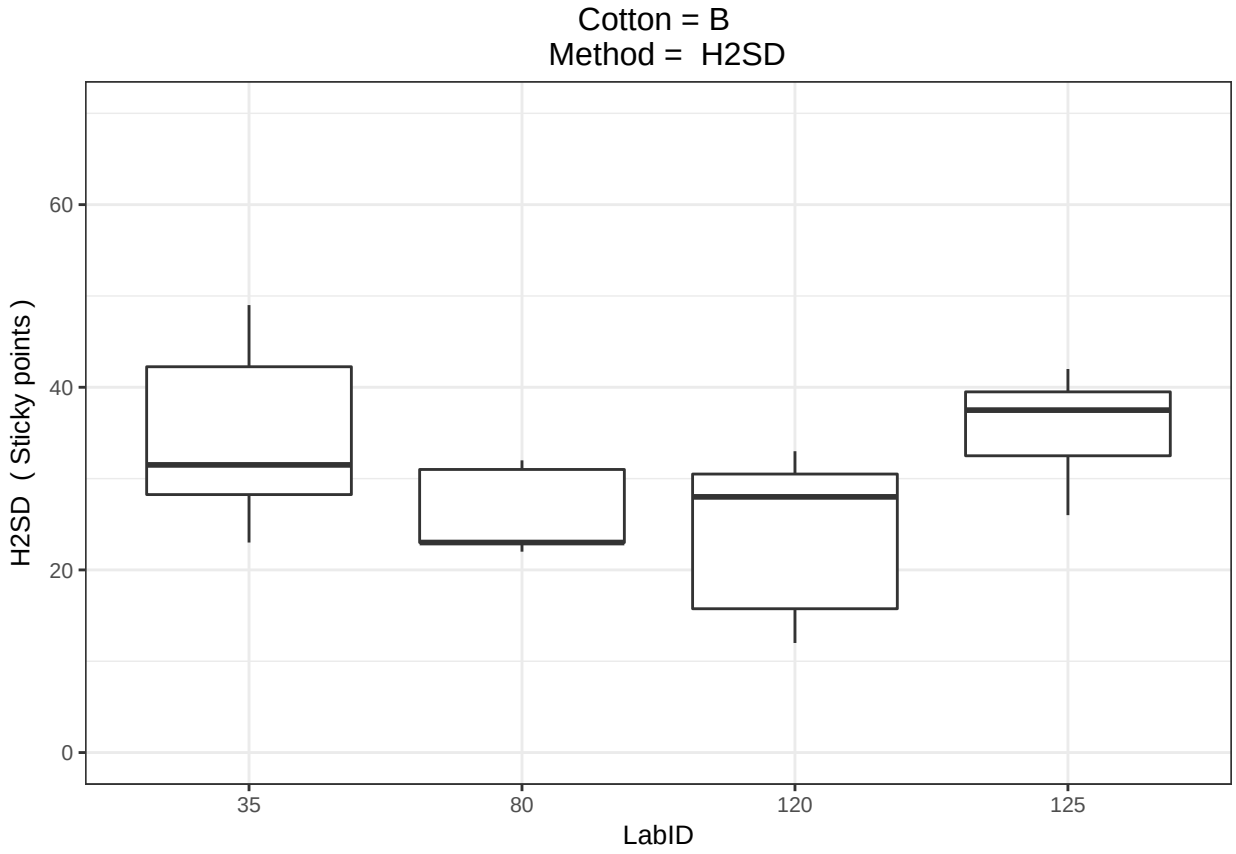

Cotton = A
Method = SCT
SCT (Sticky points)
150
100
50
0
5
30
40
45
55
60
70
110
155
LabID

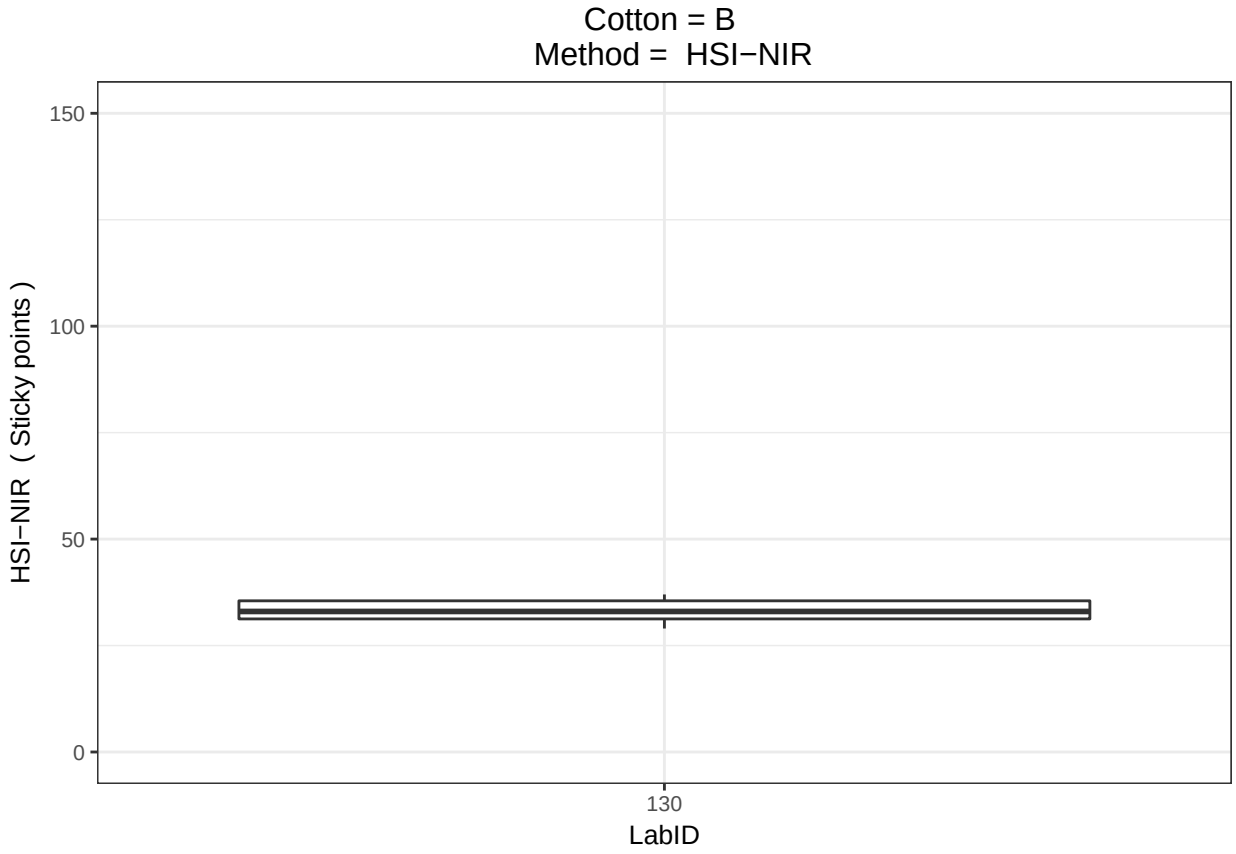
Boxplots for Cotton B

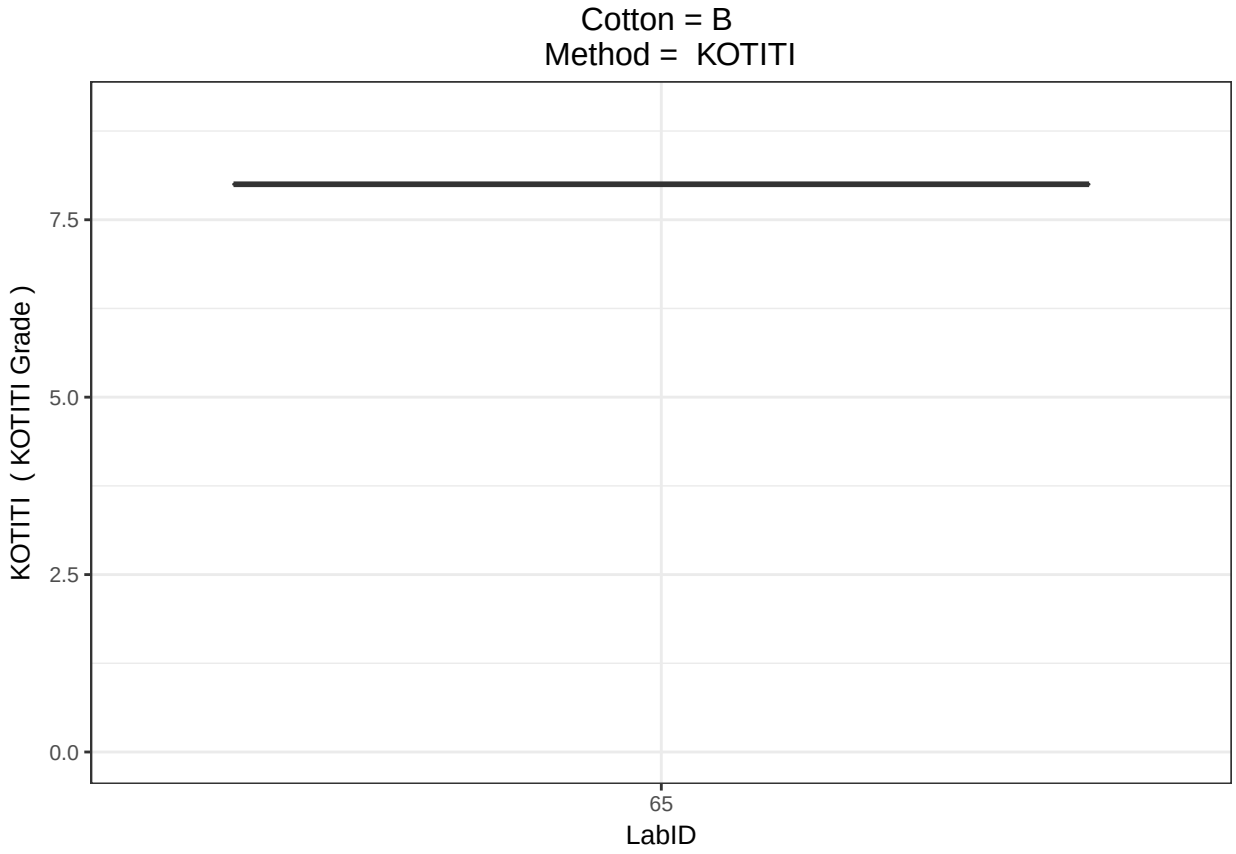


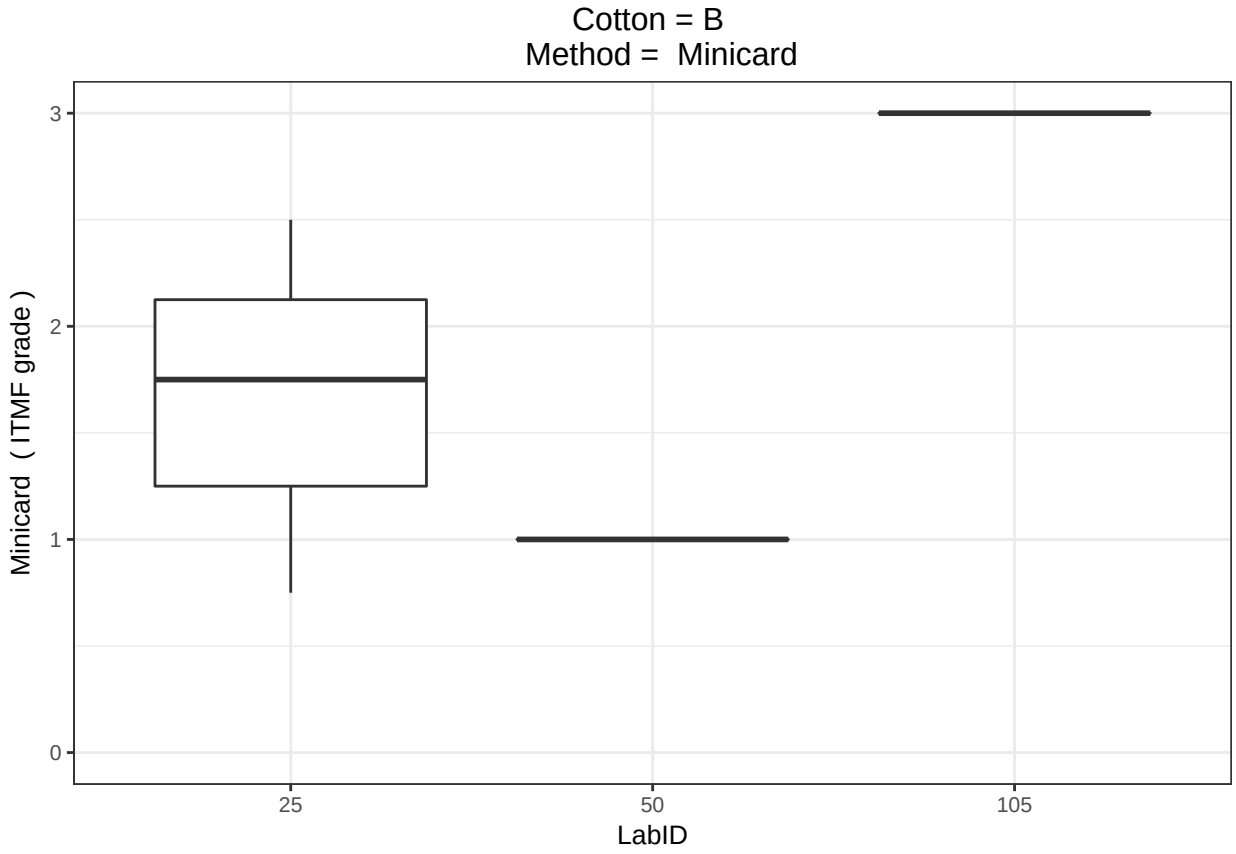

Cotton = B
Method = Clinitest
Clinitest (Color chart)
6
4
2
0
10
LabID

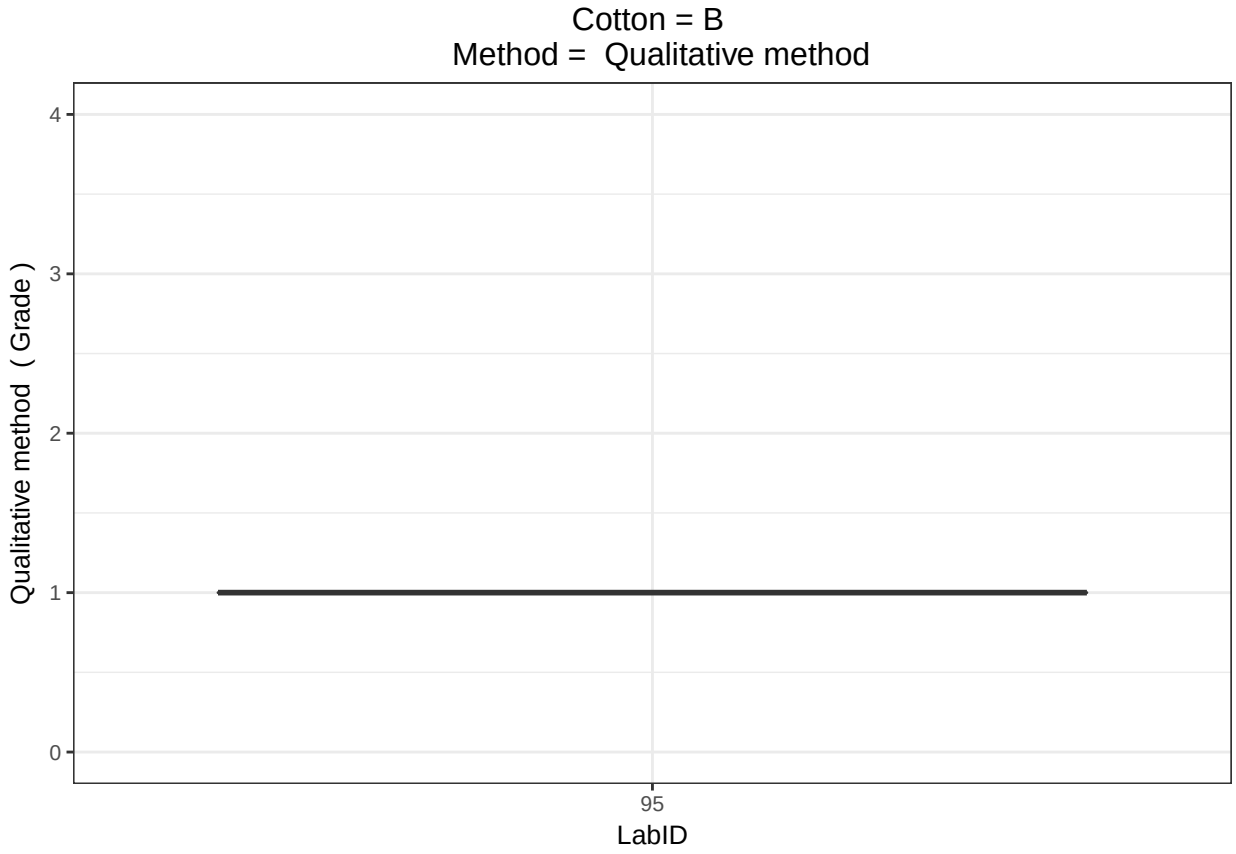

Cotton = B
Method = Contest−Fibermap
Contest−Fibermap (C/F Grade)
600
400
200
0
20
75
85
90
LabID

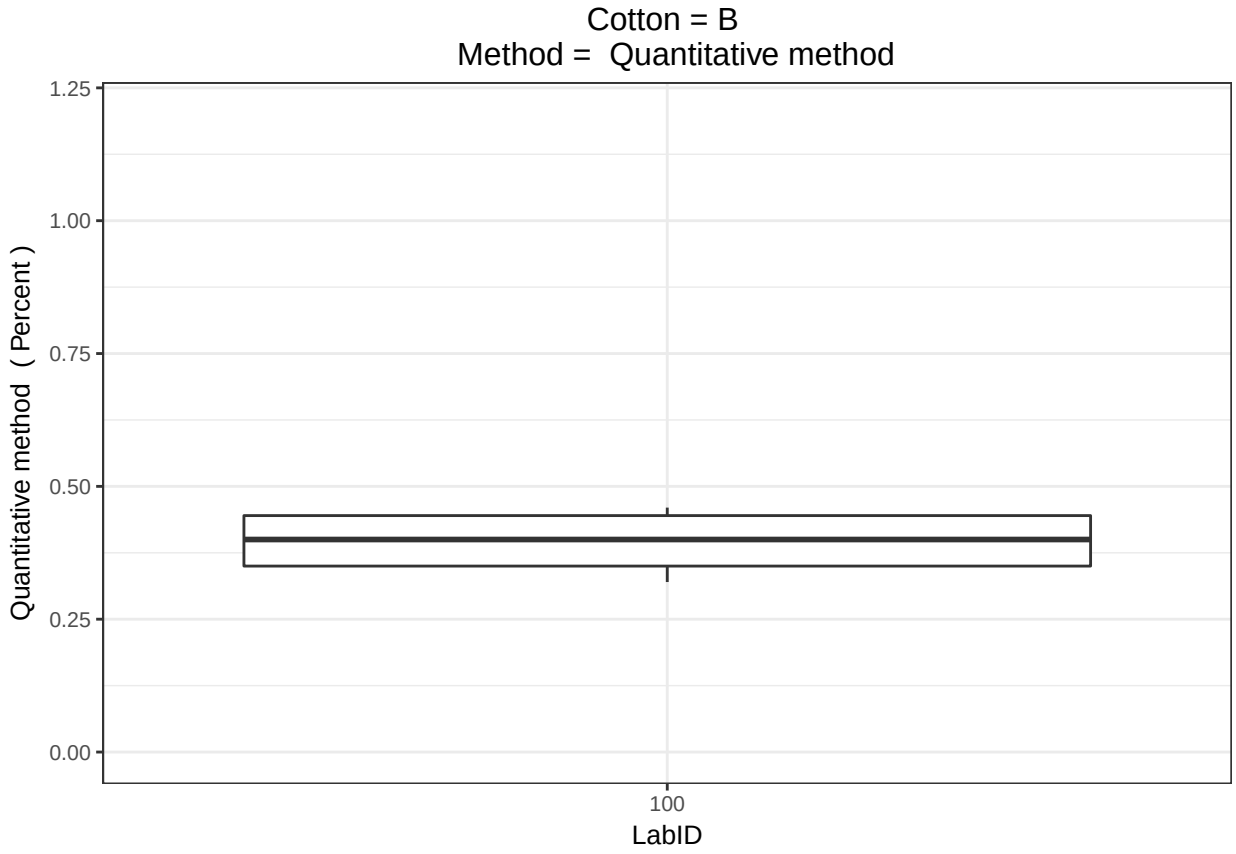

Cotton = B
Method = H2SD
H2SD (Sticky points)
60
40
20
0
35
80
120
125
LabID

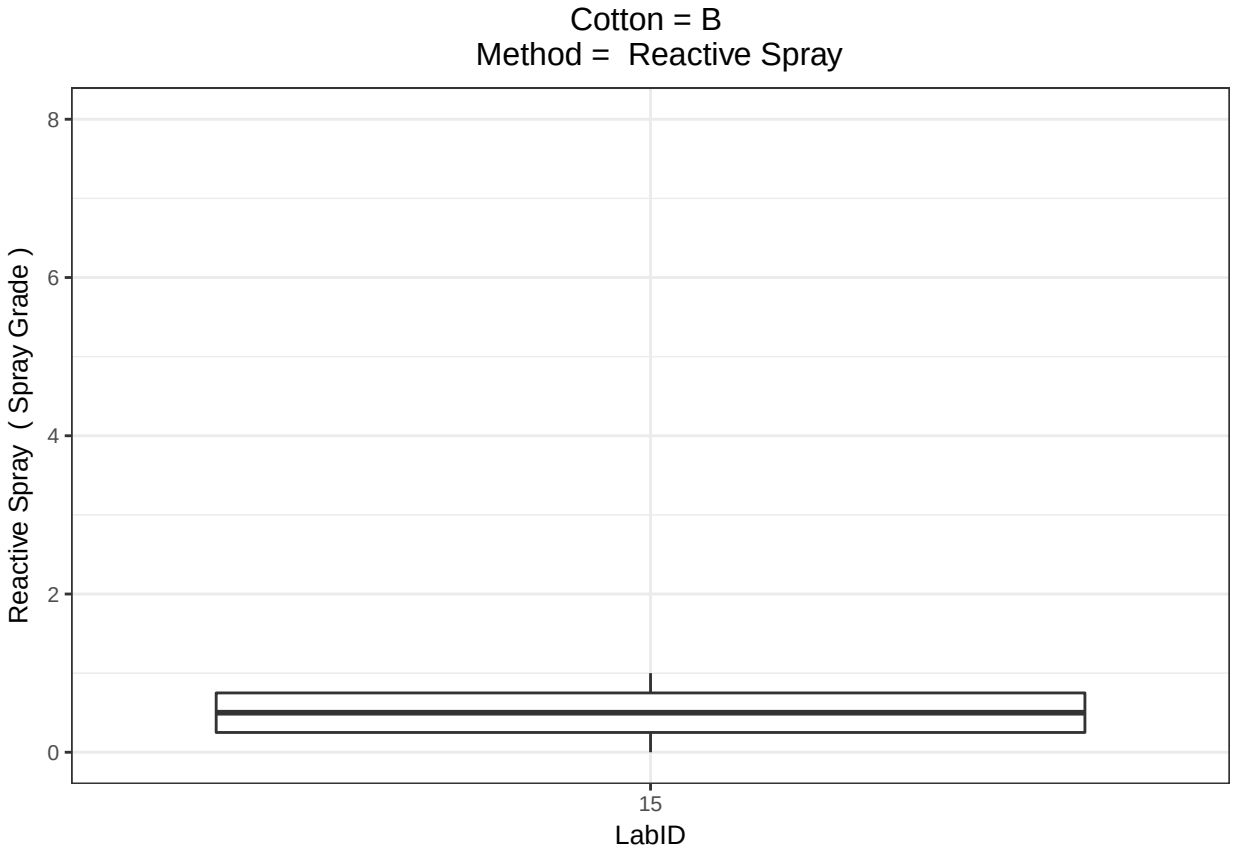

Cotton = B
Method = HSI−NIR
150
100
50
0
HSI−NIR (Sticky points)
130
LabID

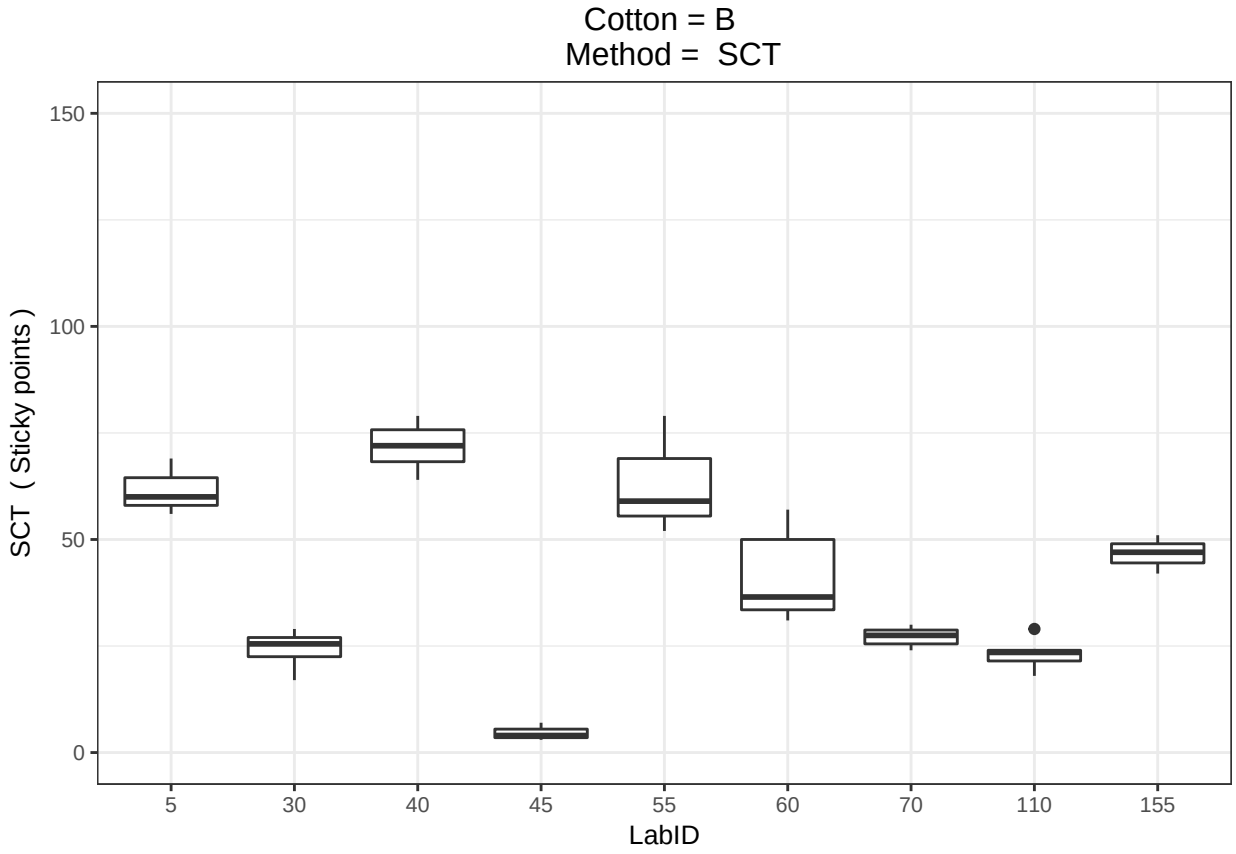

Cotton = B
Method = KOTITI
7.5
5.0
2.5
0.0
KOTITI (KOTITI Grade)
65
LabID


Cotton = B
Method = Minicard
Minicard (ITMF grade)
3
2
1
0
25
50
105
LabID

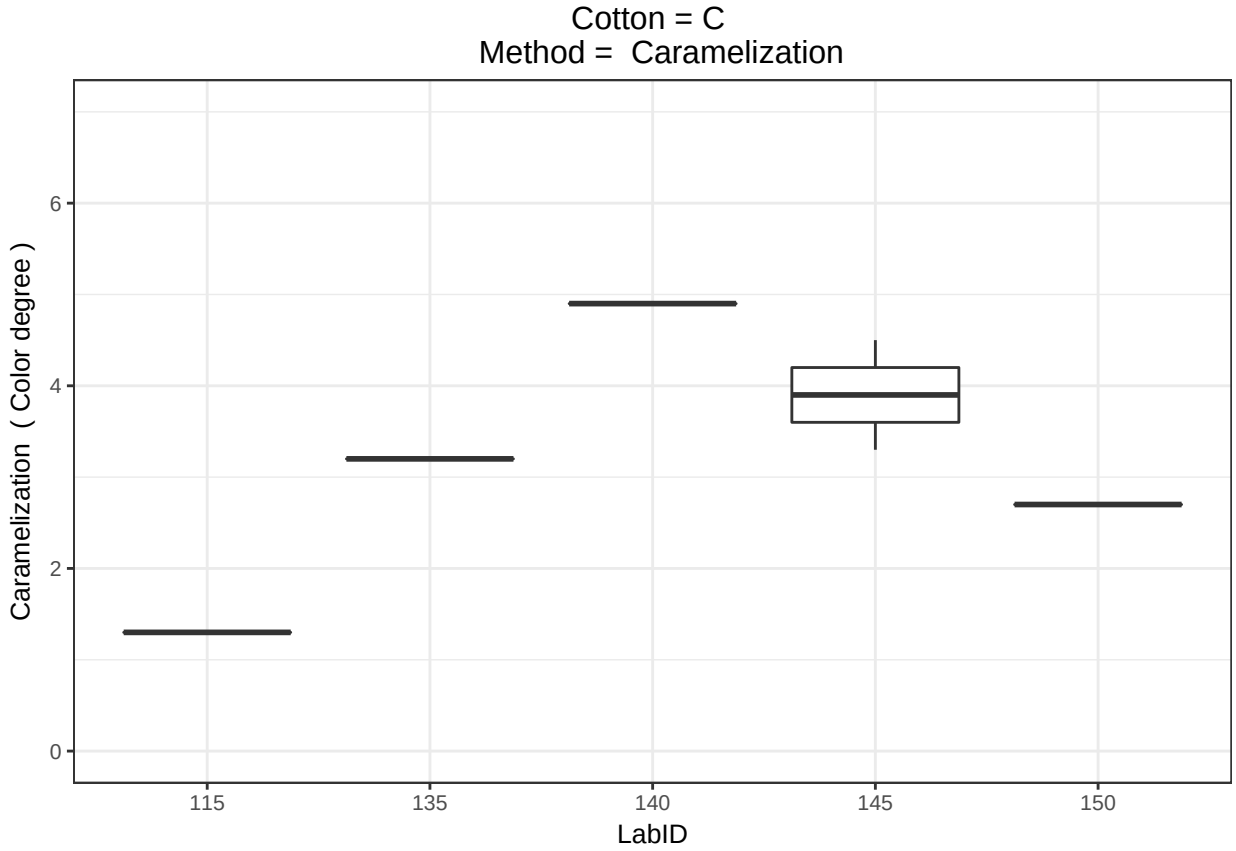

Cotton = B
Method = Qualitative method
Qualitative method (Grade)
4
3
2
1
0
95
LabID

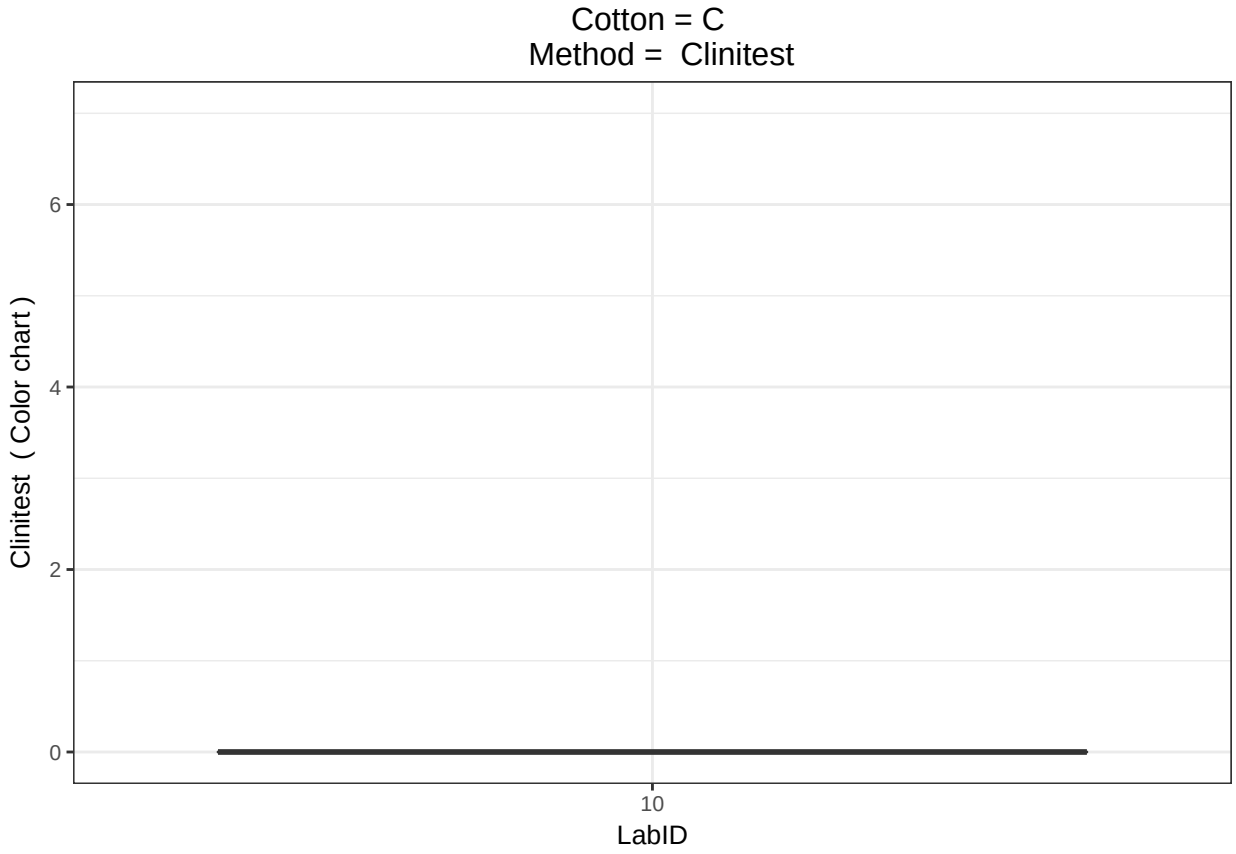

Cotton = B
Method = Quantitative method
Quantitative method (Percent)
1.25
1.00
0.75
0.50
0.25
0.00
100
LabID

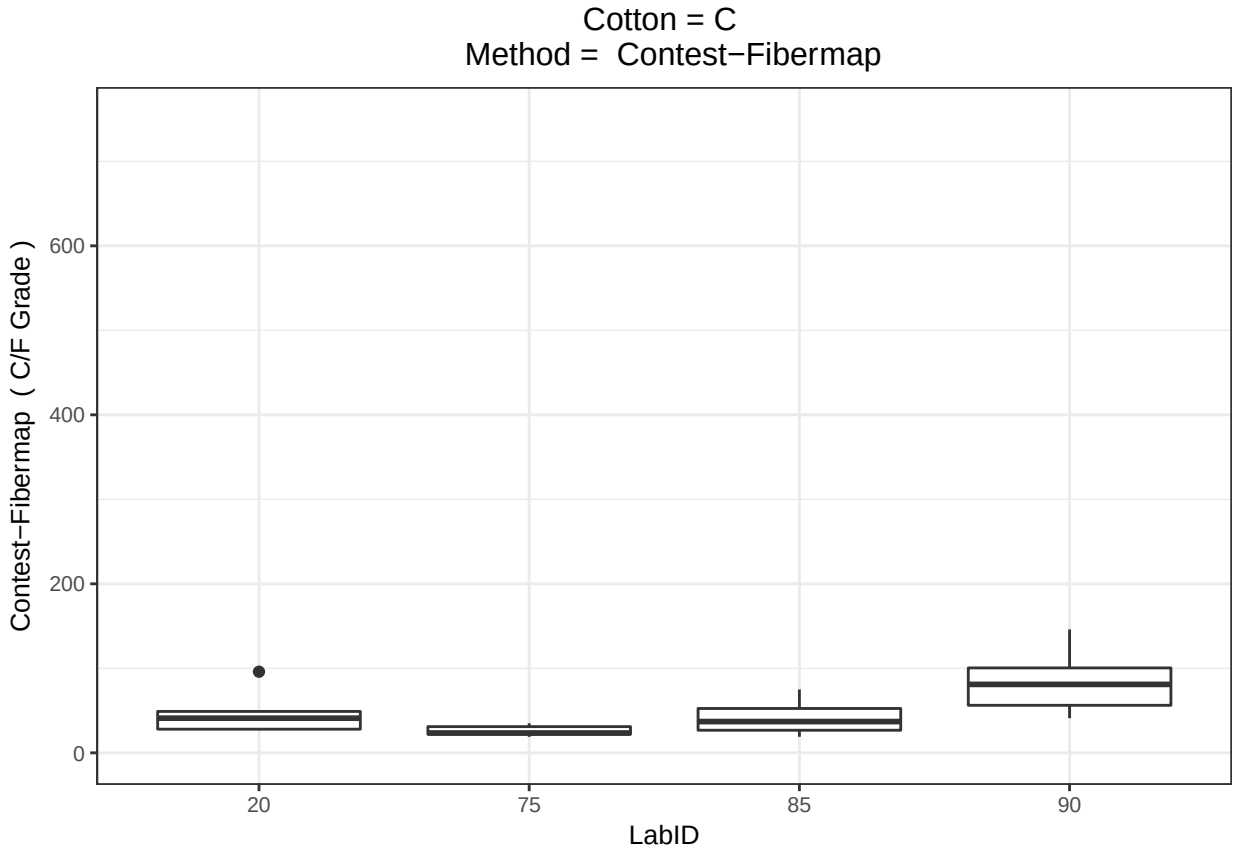

Cotton = B
Method = Reactive Spray
Reactive Spray (Spray Grade)
8
6
4
2
0
15
LabID

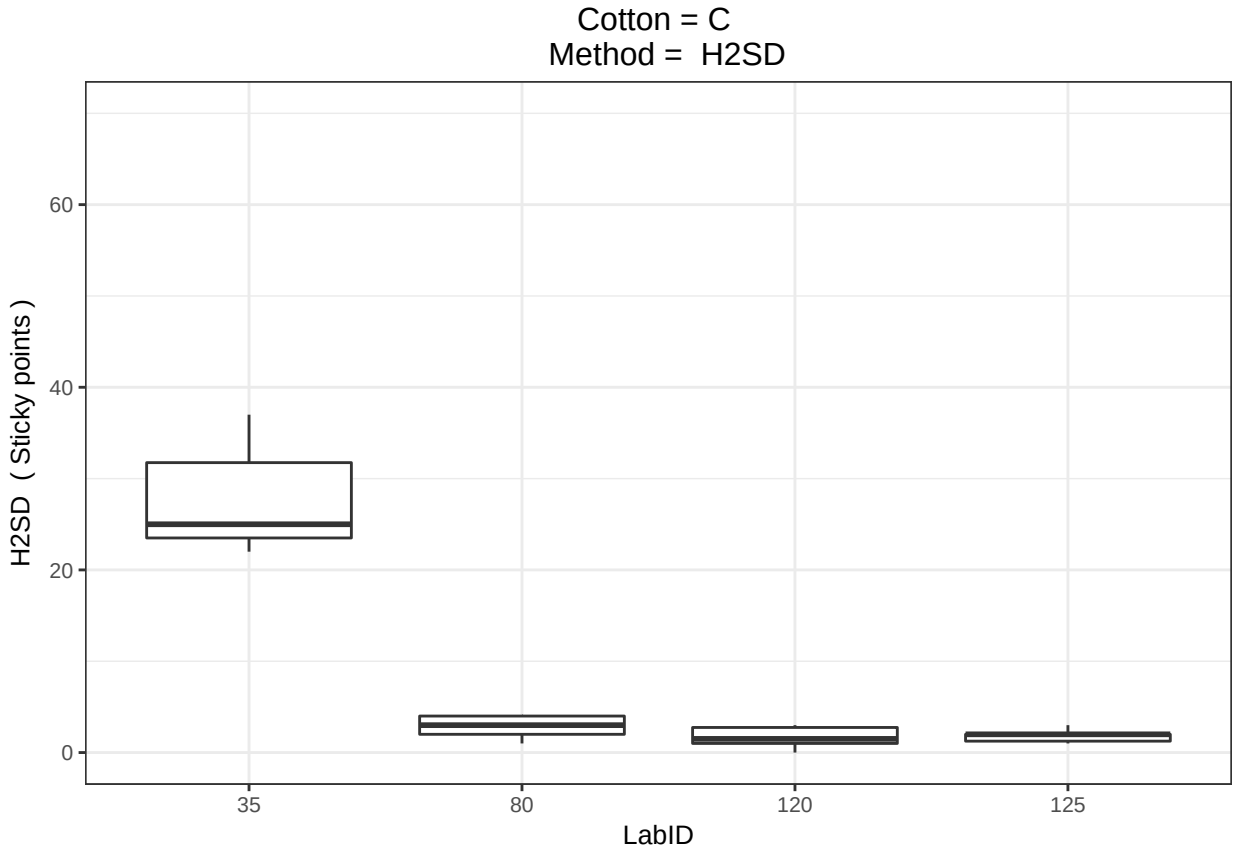

Cotton = B
Method = SCT
SCT (Sticky points)
150
100
50
0
5
30
40
45
55
60
70
110
155
LabID

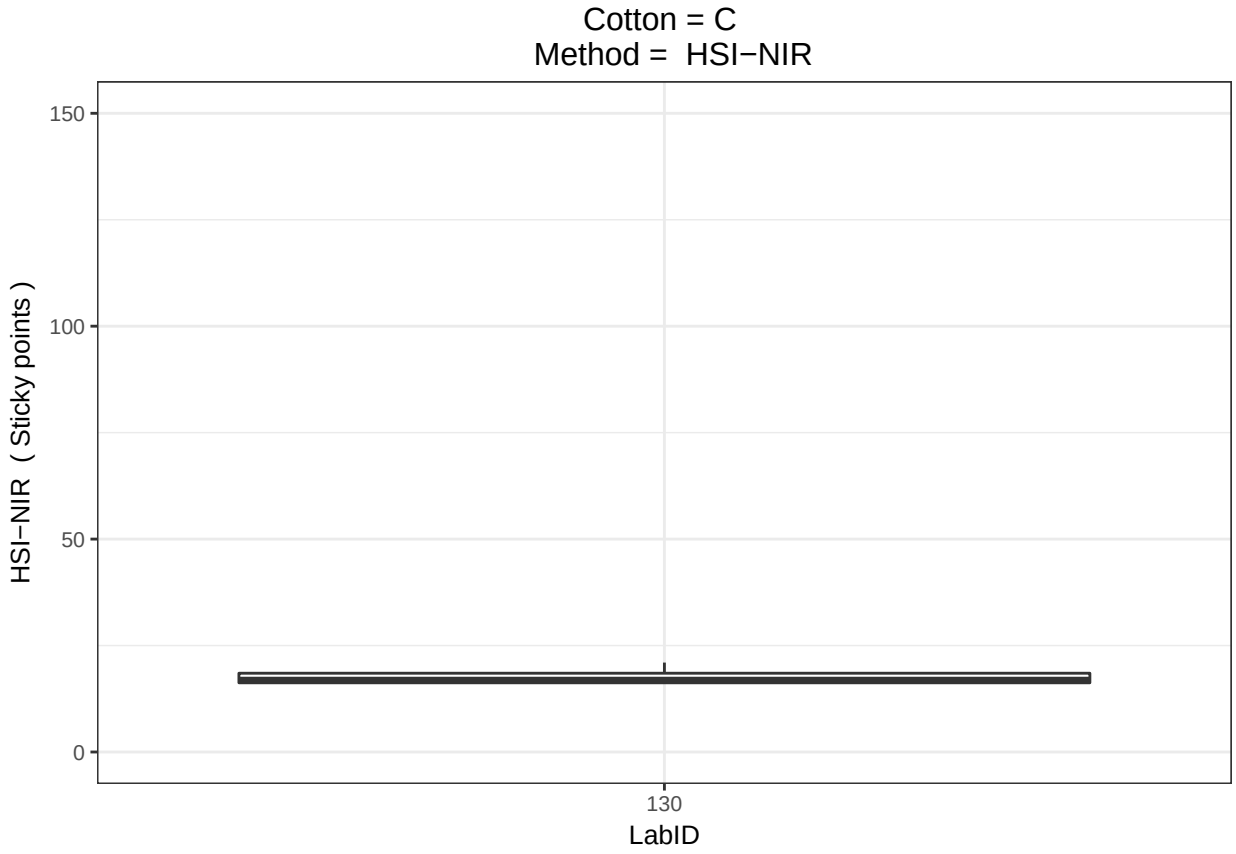
Boxplots for Cotton C

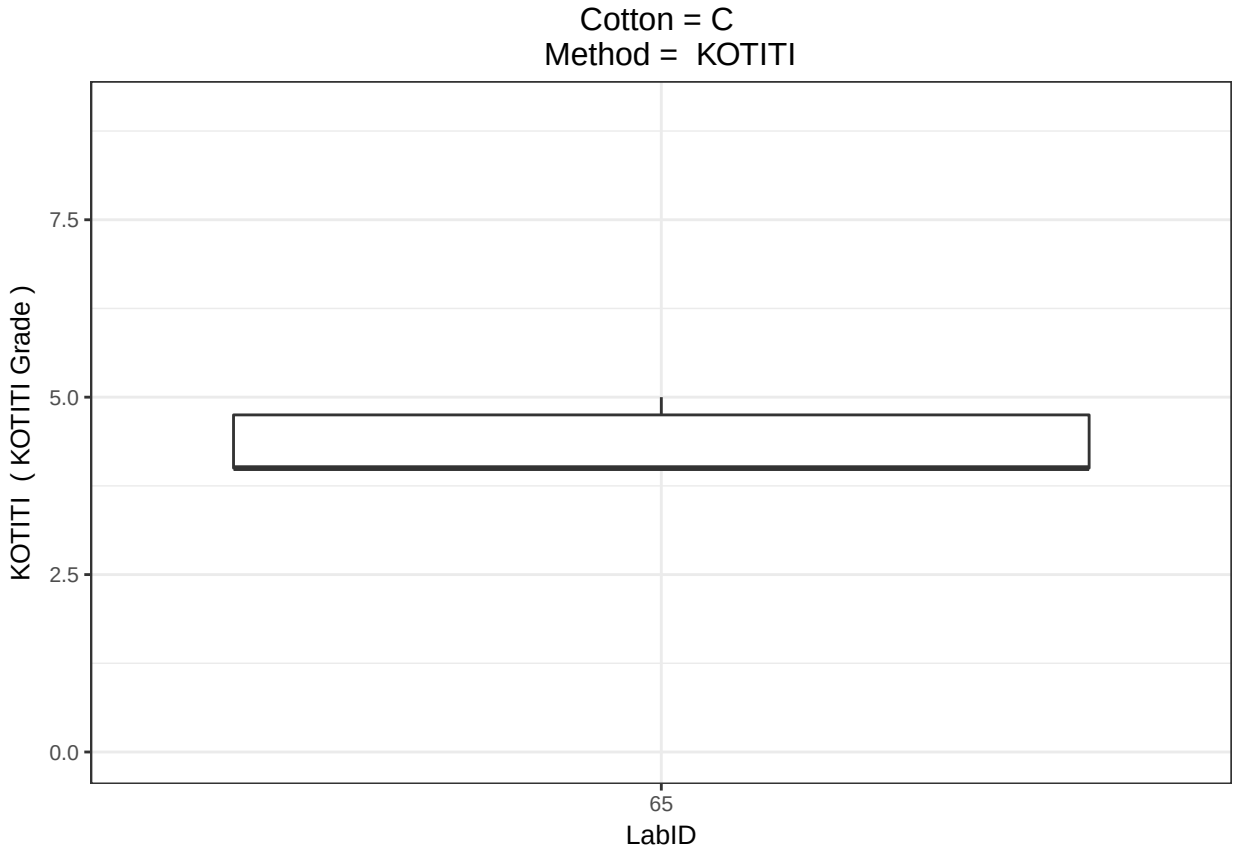


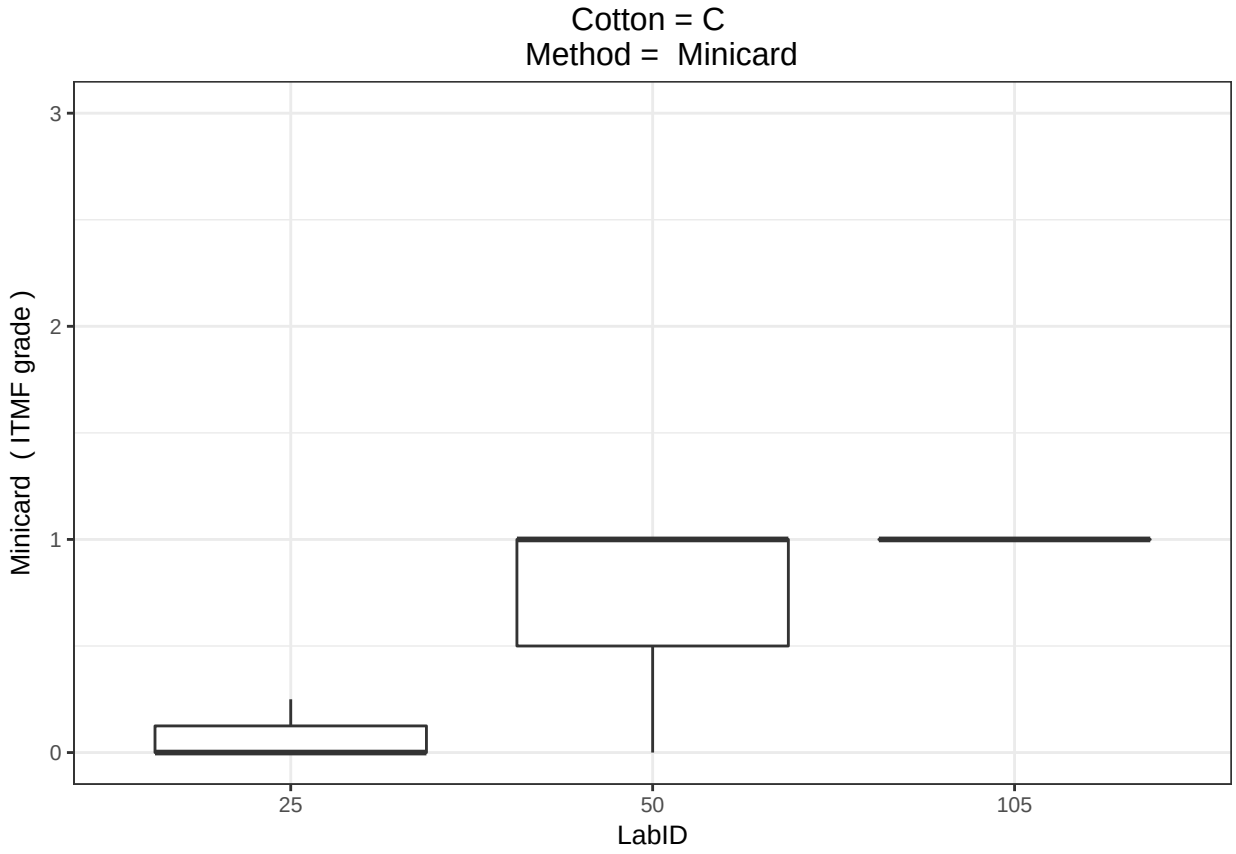

Cotton = C
Method = Clinitest
Clinitest (Color chart)
6
4
2
0
10
LabID

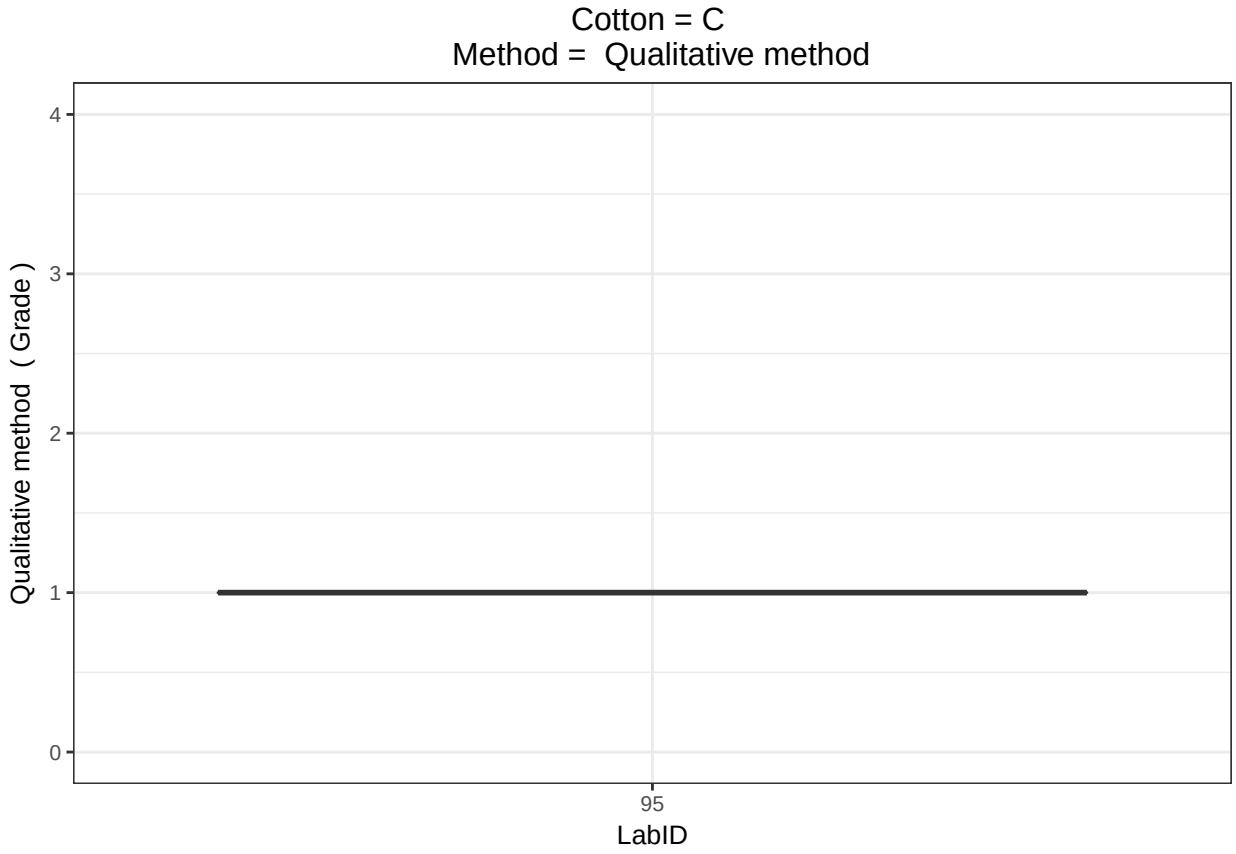

Cotton = C
Method = Contest−Fibermap
Contest−Fibermap (C/F Grade)
600
400
200
0
20
75
85
90
LabID

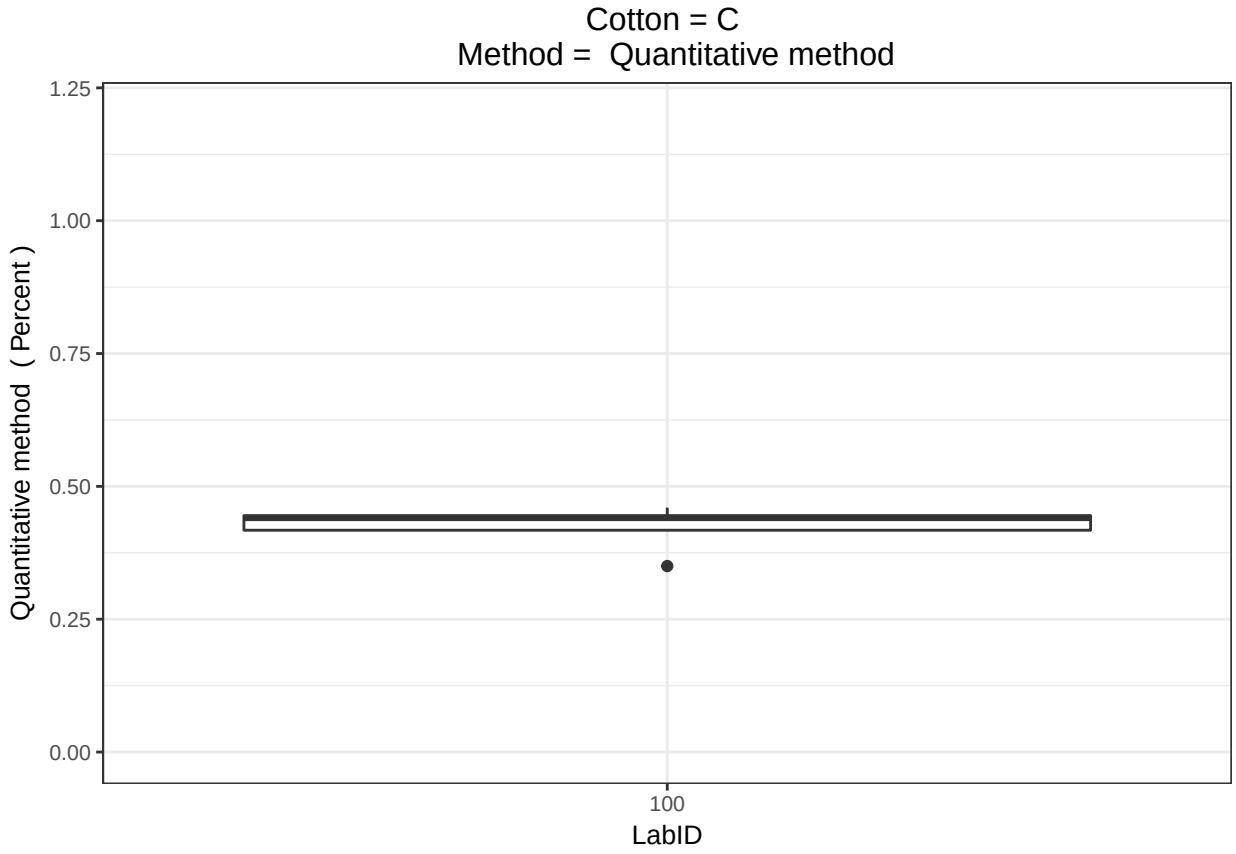

Cotton = C
Method = H2SD
H2SD (Sticky points)
60
40
20
0
35
80
120
125
LabID

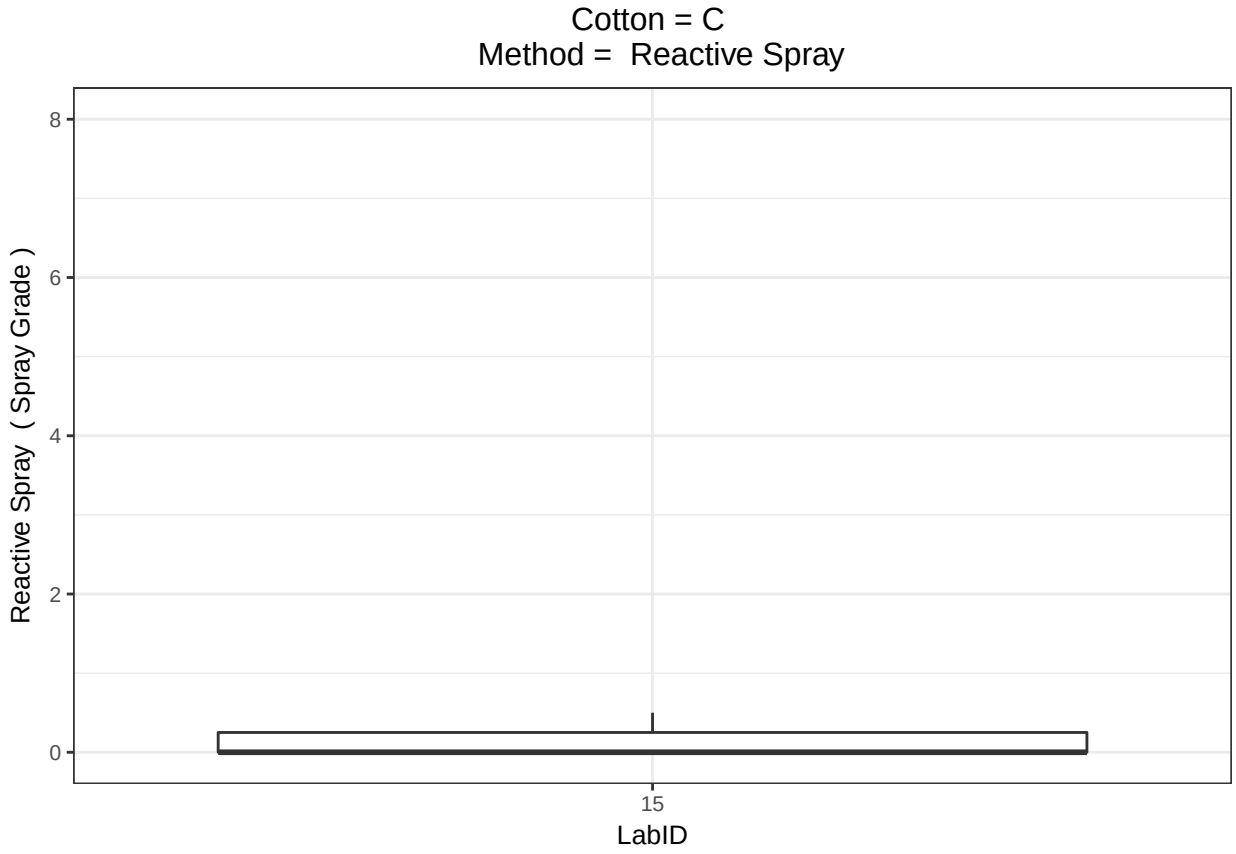

Cotton = C
Method = HSI−NIR
150
100
50
0
HSI−NIR (Sticky points)
130
LabID

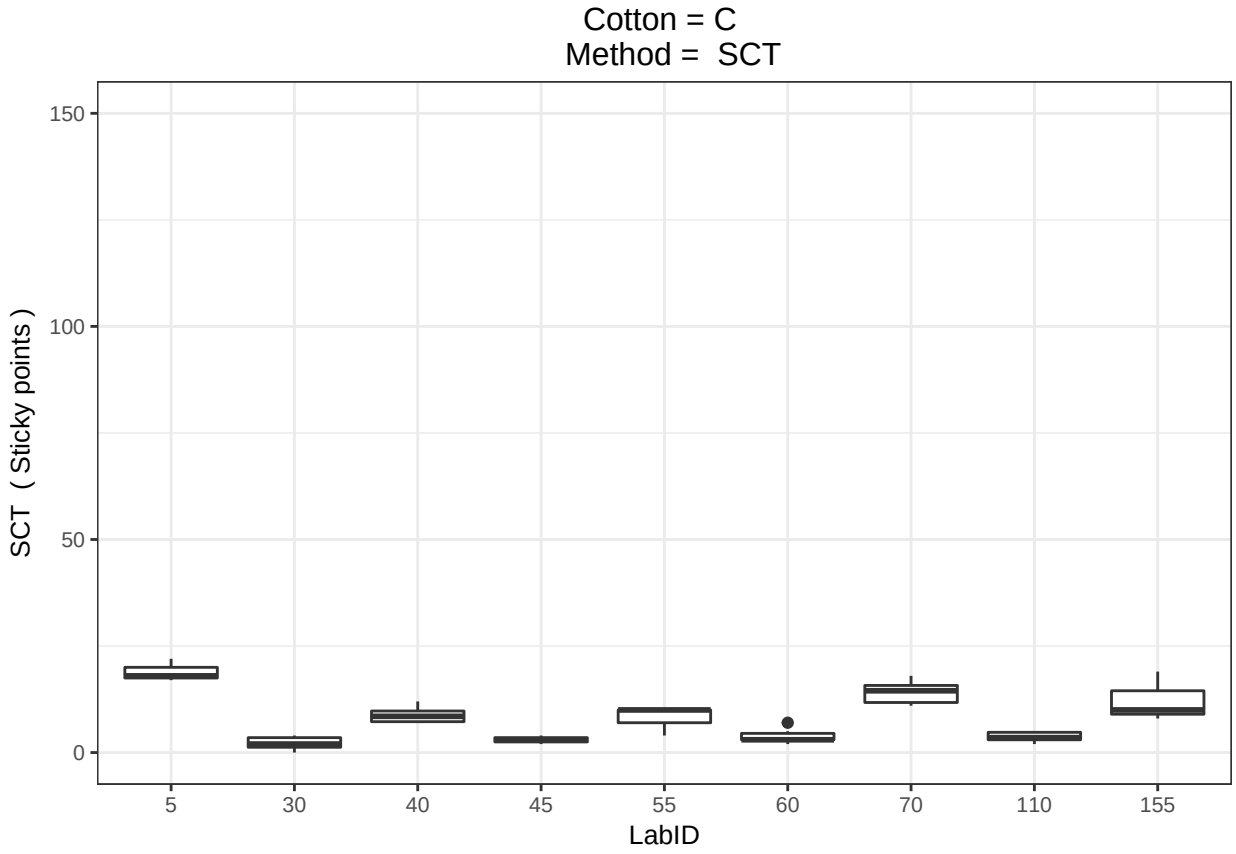

Cotton = C
Method = KOTITI
KOTITI (KOTITI Grade)
7.5
5.0
2.5
0.0
65
LabID


Cotton = C
Method = Minicard
Minicard (ITMF grade)
3
2
1
0
25
50
105
LabID

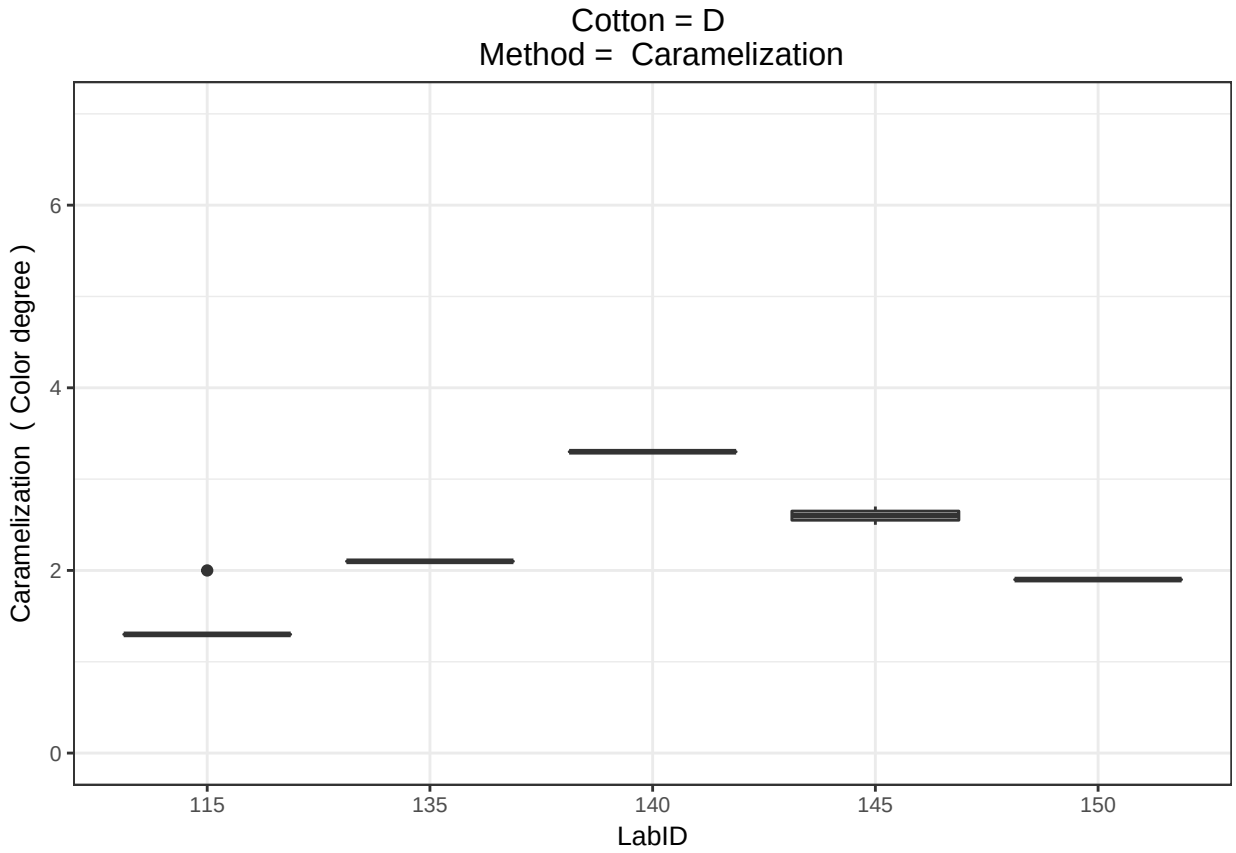

Cotton = C
Method = Qualitative method
Qualitative method (Grade)
4
3
2
1
0
95
LabID

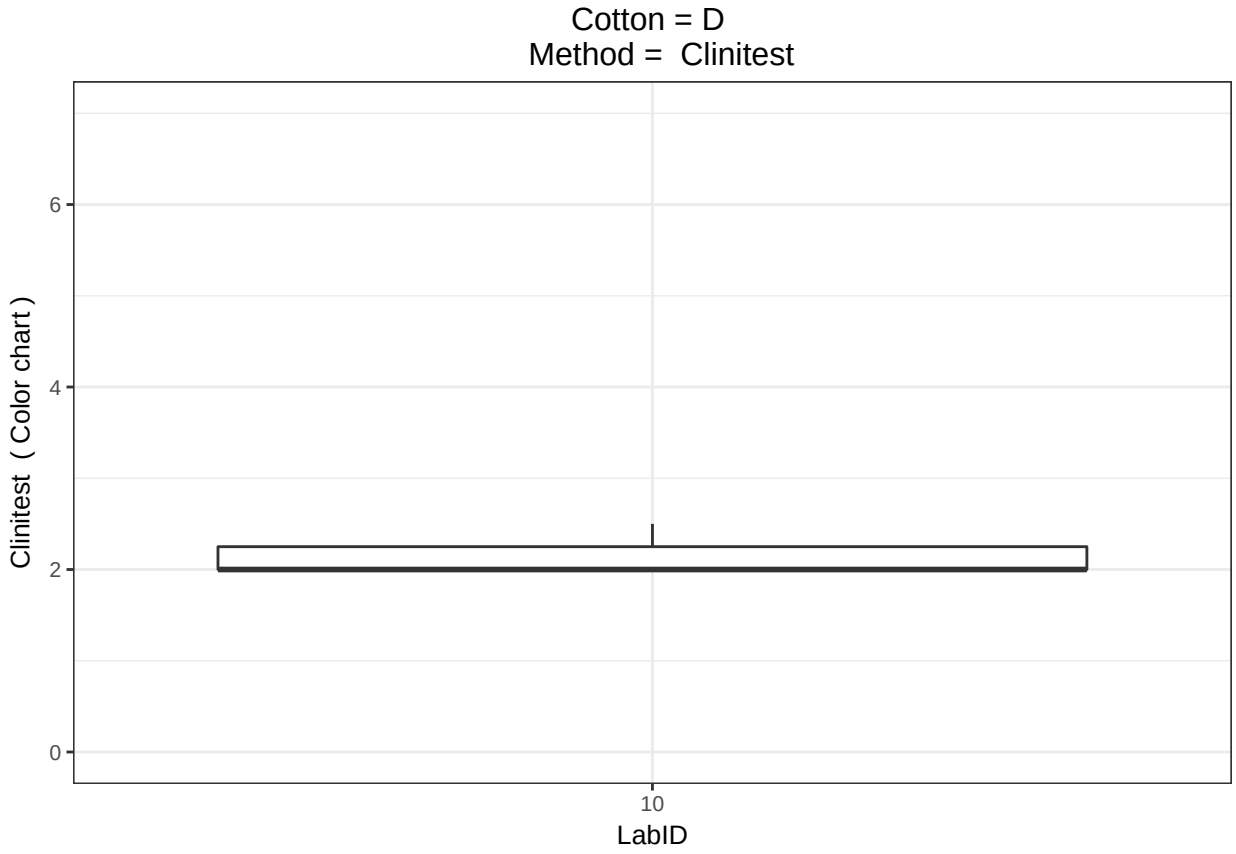

Cotton = C
Method = Quantitative method
1.25
1.00
0.75
0.50
0.25
0.00
Quantitative method (Percent)
100
LabID

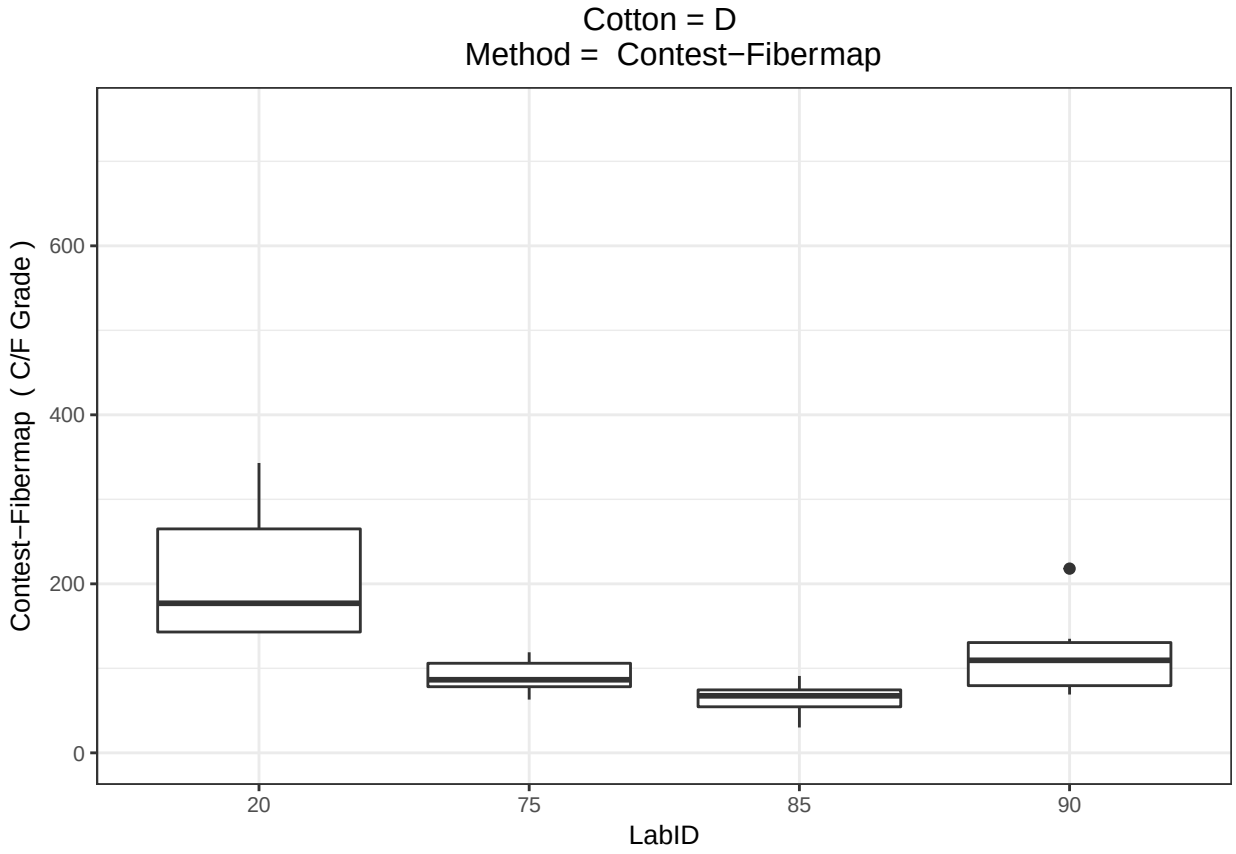

Cotton = C
Method = Reactive Spray
Reactive Spray (Spray Grade)
8
6
4
2
0
15
LabID

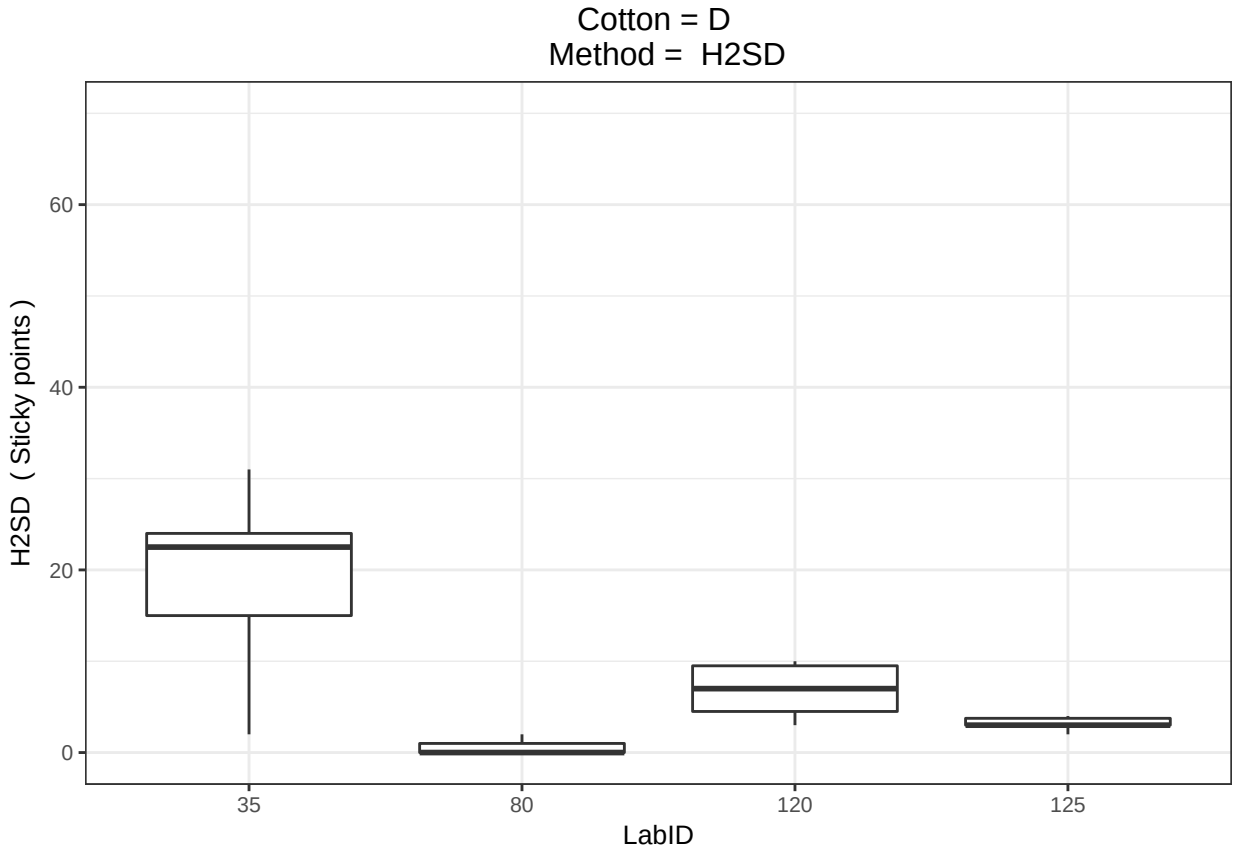

Cotton = C
Method = SCT
SCT (Sticky points)
150
100
50
0
5
30
40
45
55
60
70
110
155
LabID

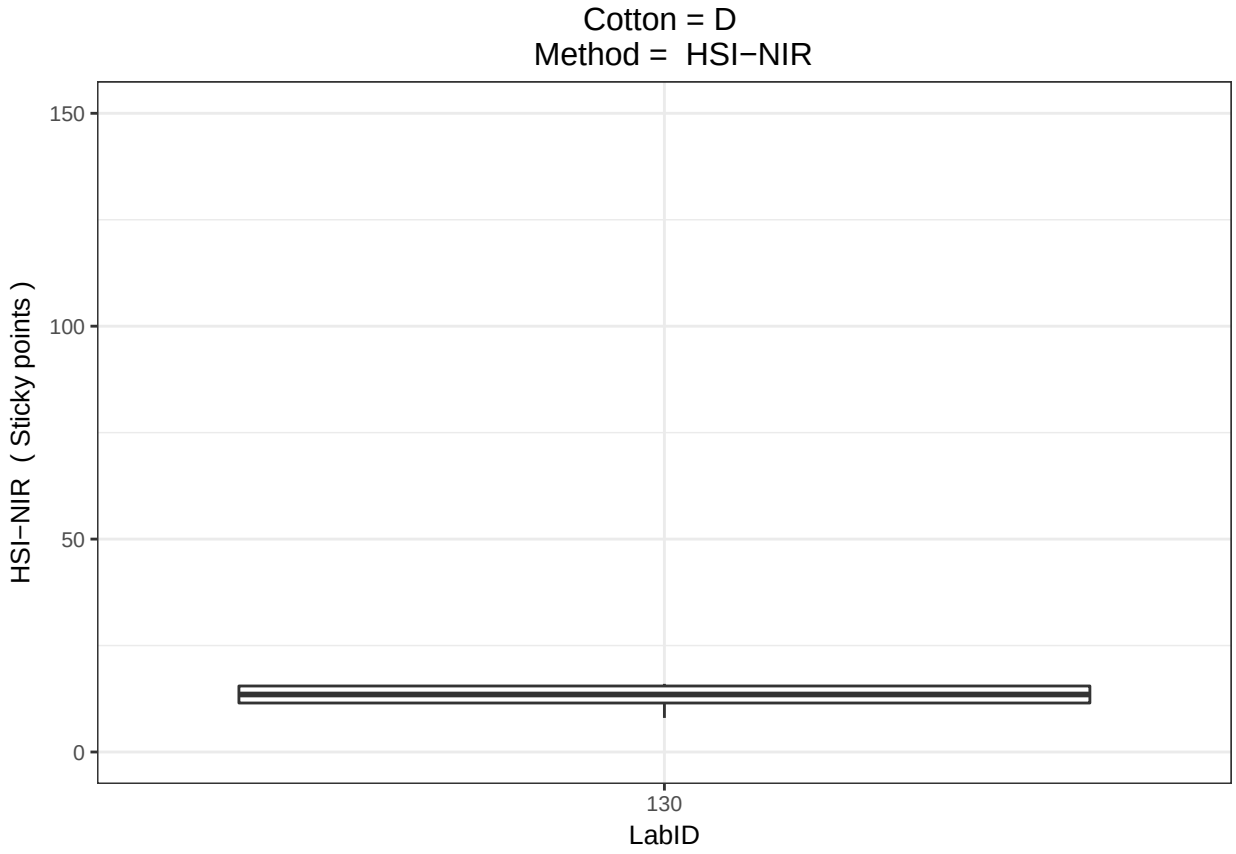
Boxplots for Cotton D

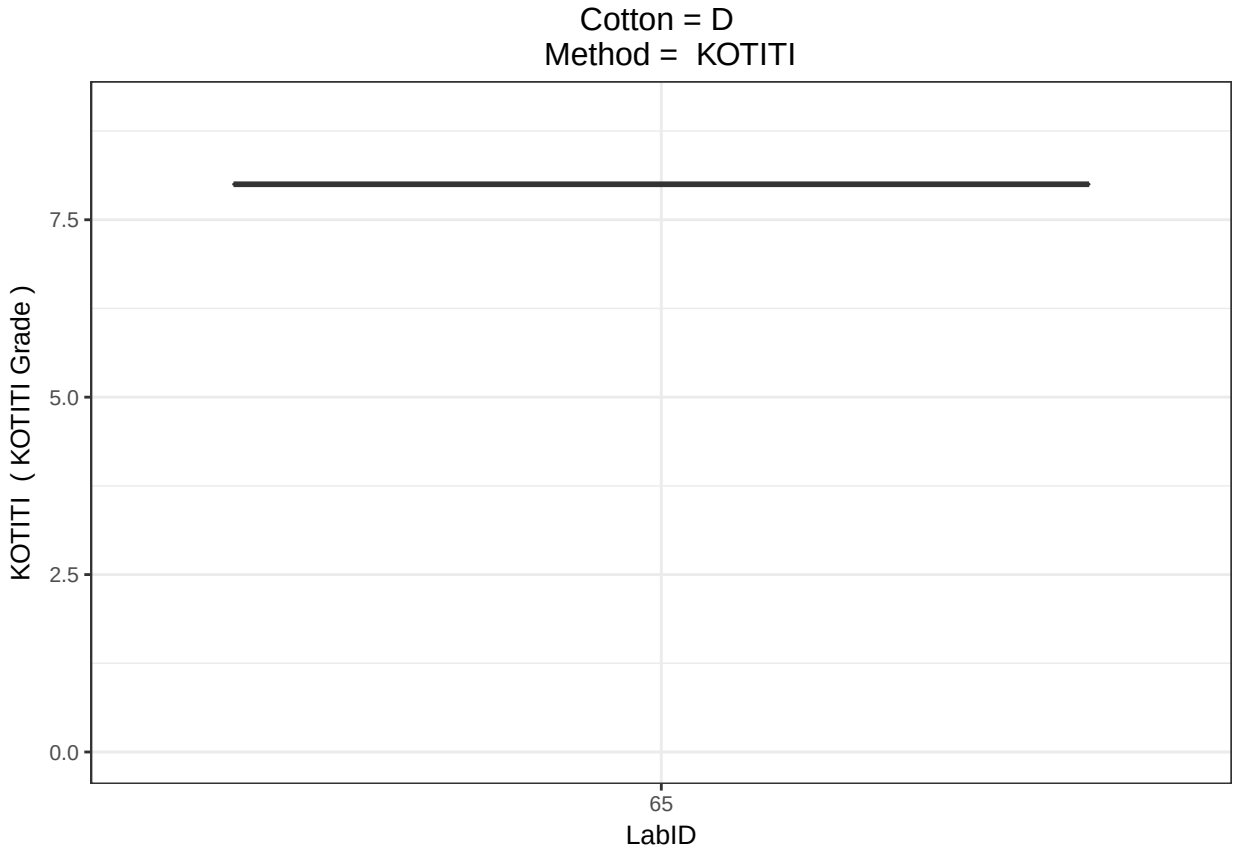


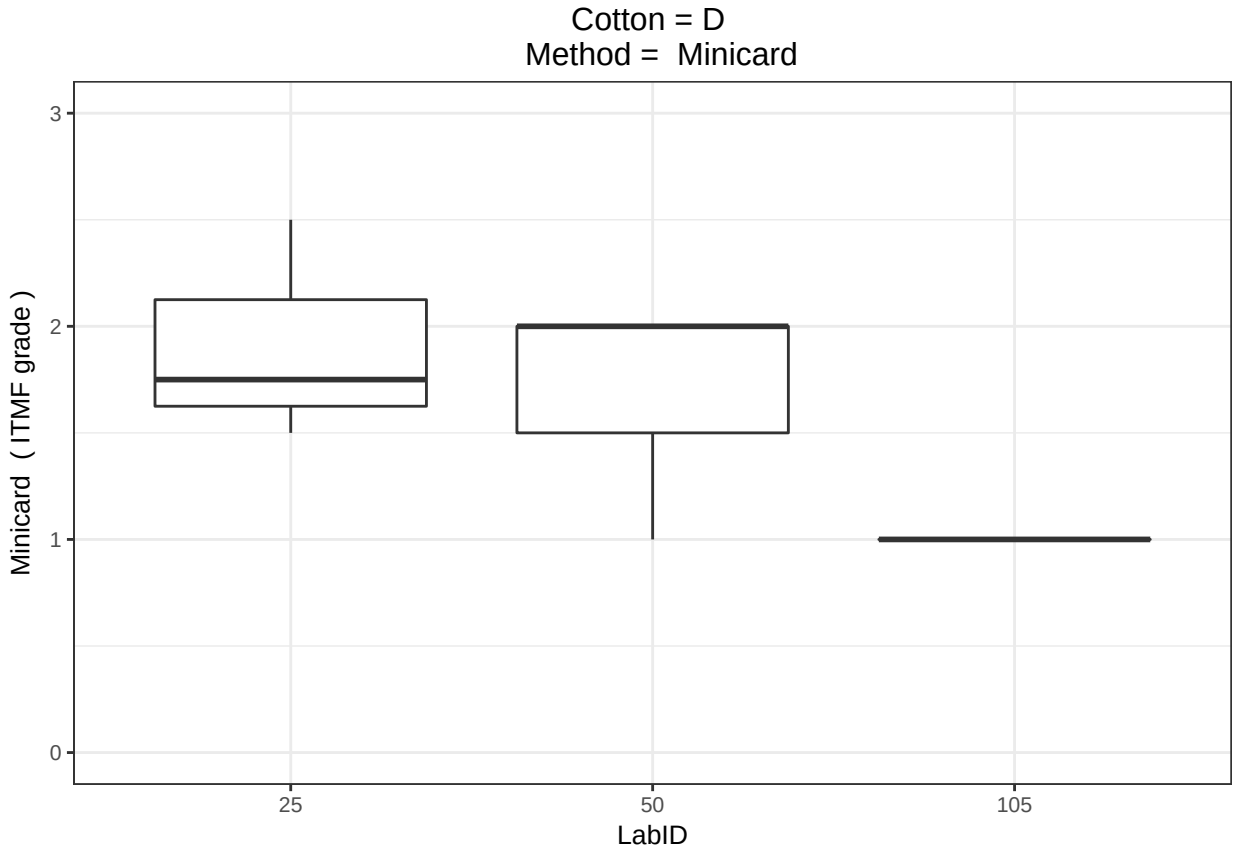

Cotton = D
Method = Clinitest
Clinitest (Color chart)
6
4
2
0
10
LabID

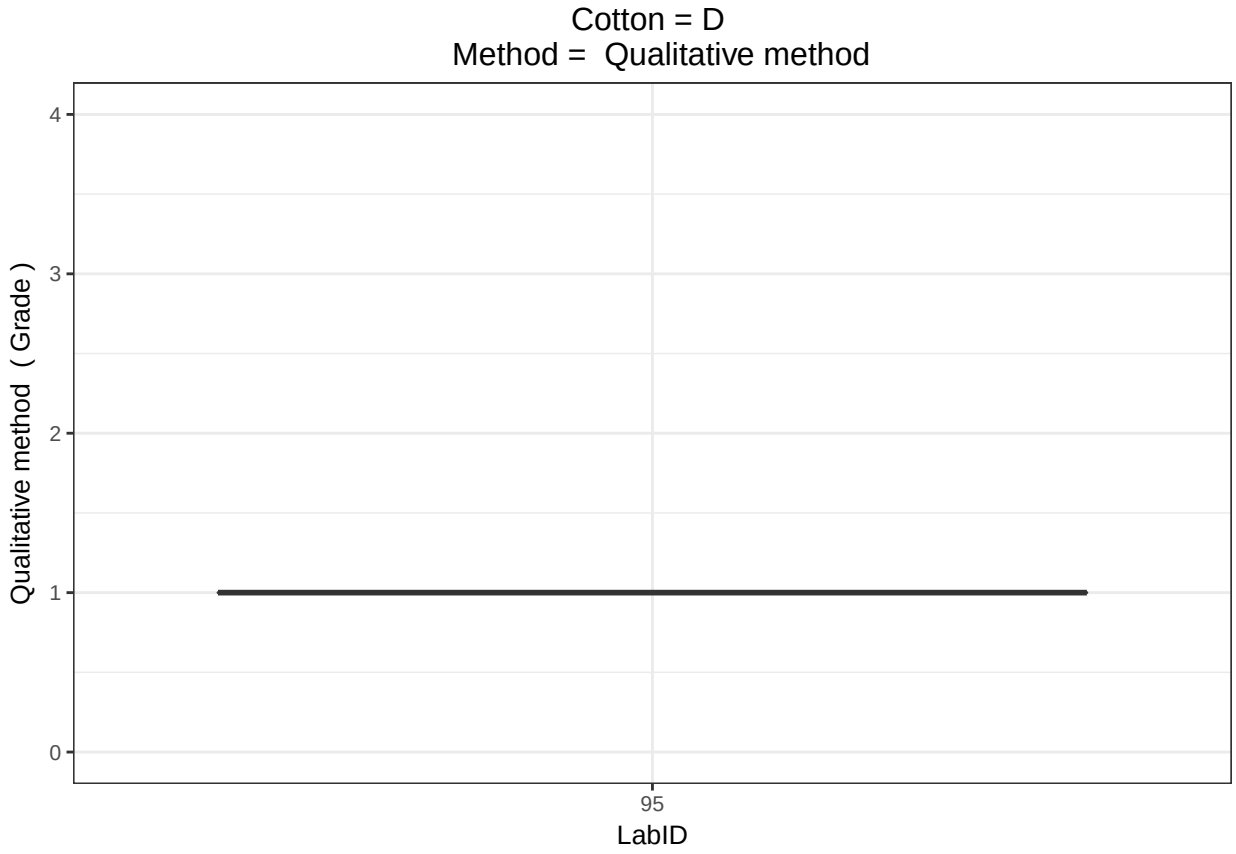

Cotton = D
Method = Contest−Fibermap
Contest−Fibermap (C/F Grade)
600
400
200
0
20
75
85
90
LabID

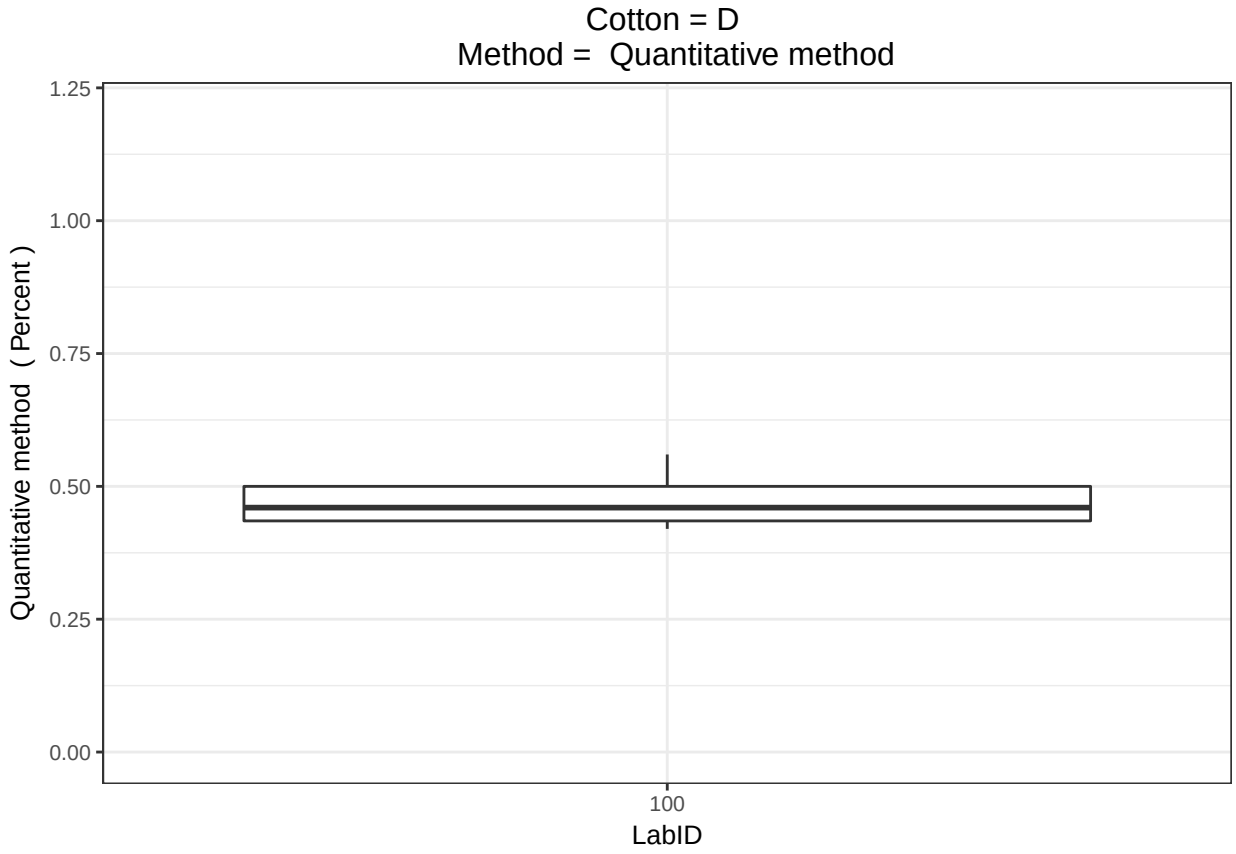

Cotton = D
Method = H2SD
H2SD (Sticky points)
60
40
20
0
35
80
120
125
LabID

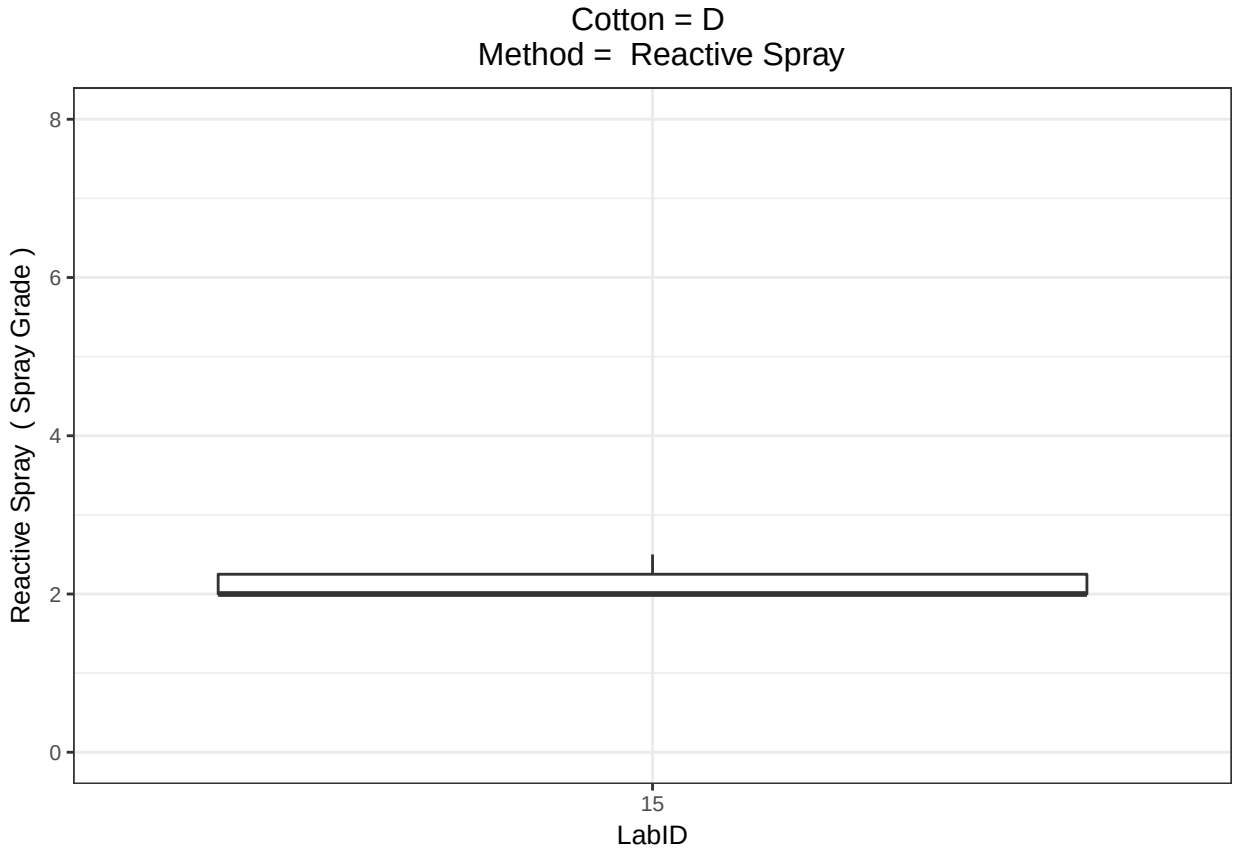

Cotton = D
Method = HSI−NIR
HSI−NIR (Sticky points)
150
100
50
0
130
LabID

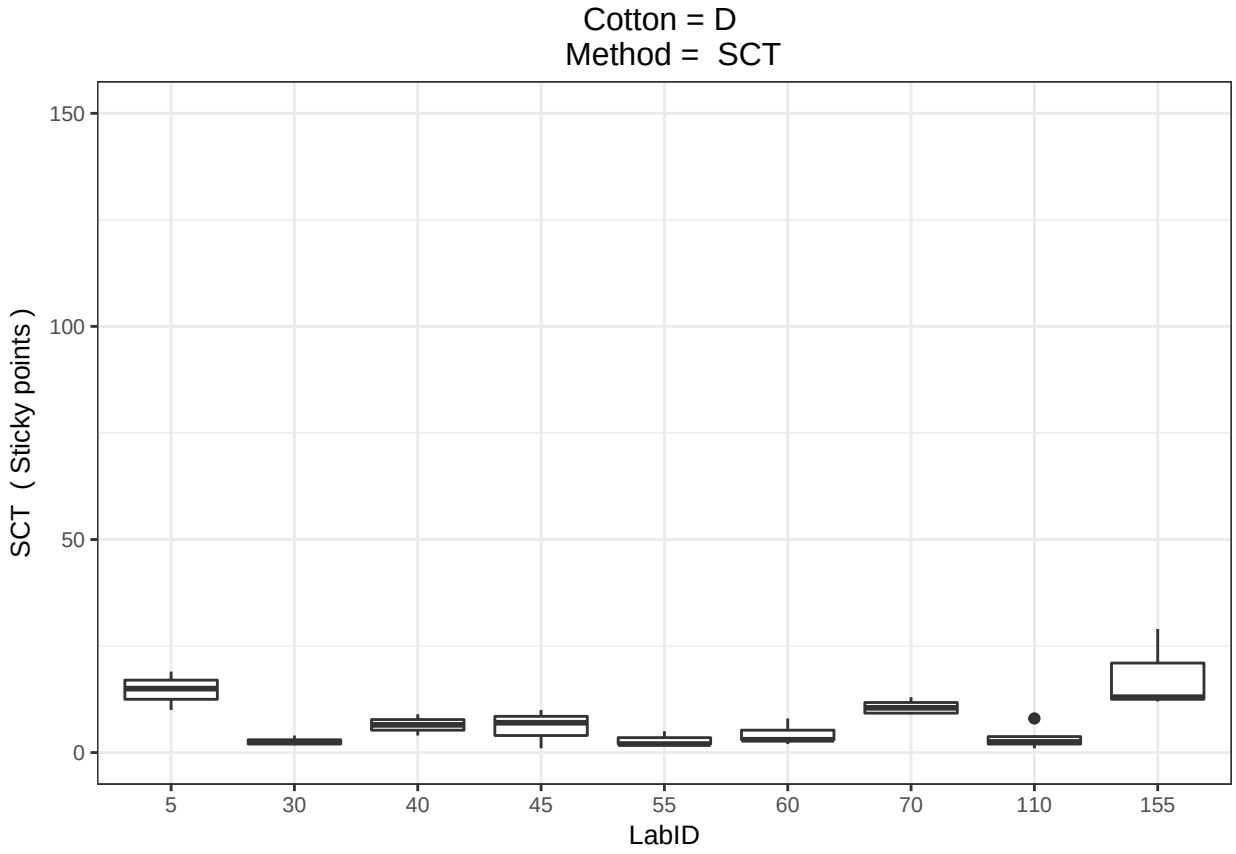

Cotton = D
Method = KOTITI
KOTITI (KOTITI Grade)
7.5
5.0
2.5
0.0
65
LabID


Cotton = D
Method = Minicard
Minicard (ITMF grade)
3
2
1
0
25
50
105
LabID

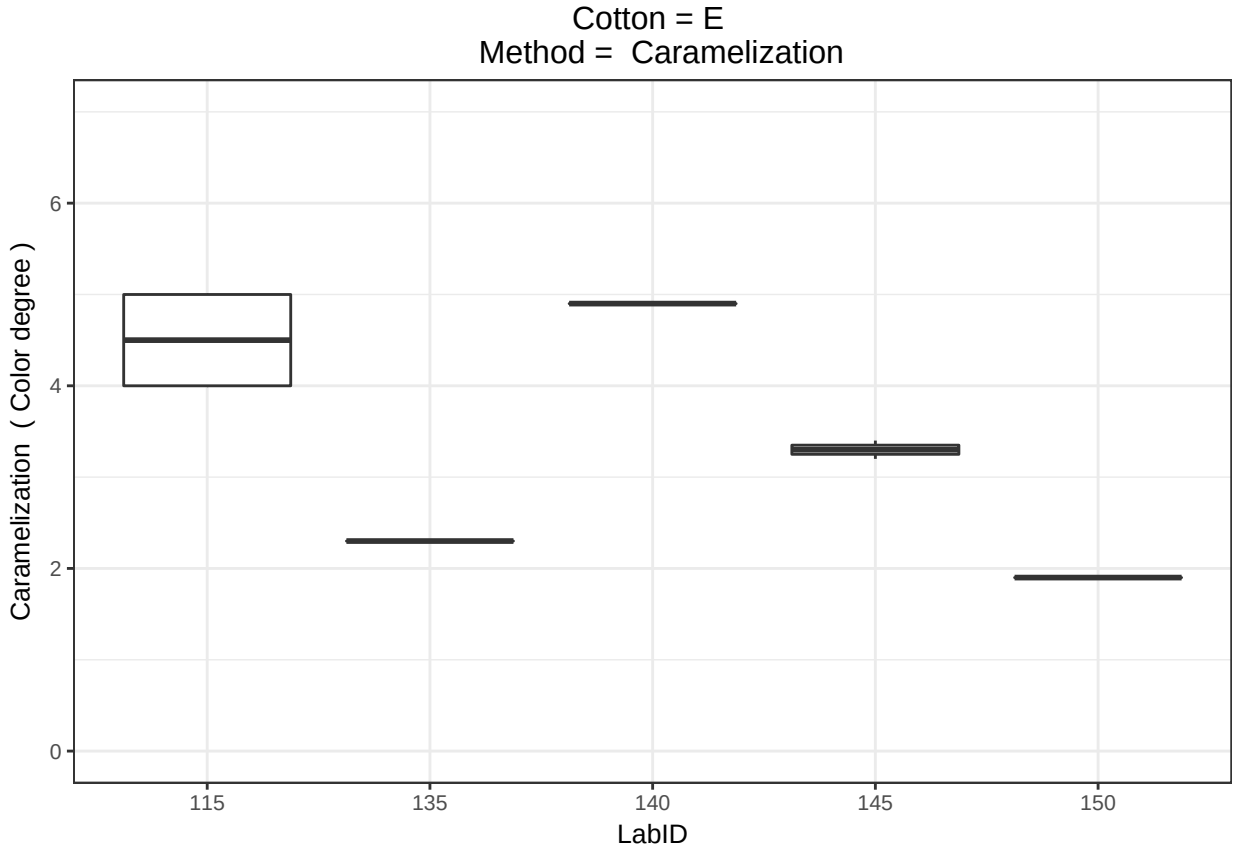

Cotton = D
Method = Qualitative method
Qualitative method (Grade)
4
3
2
1
0
95
LabID

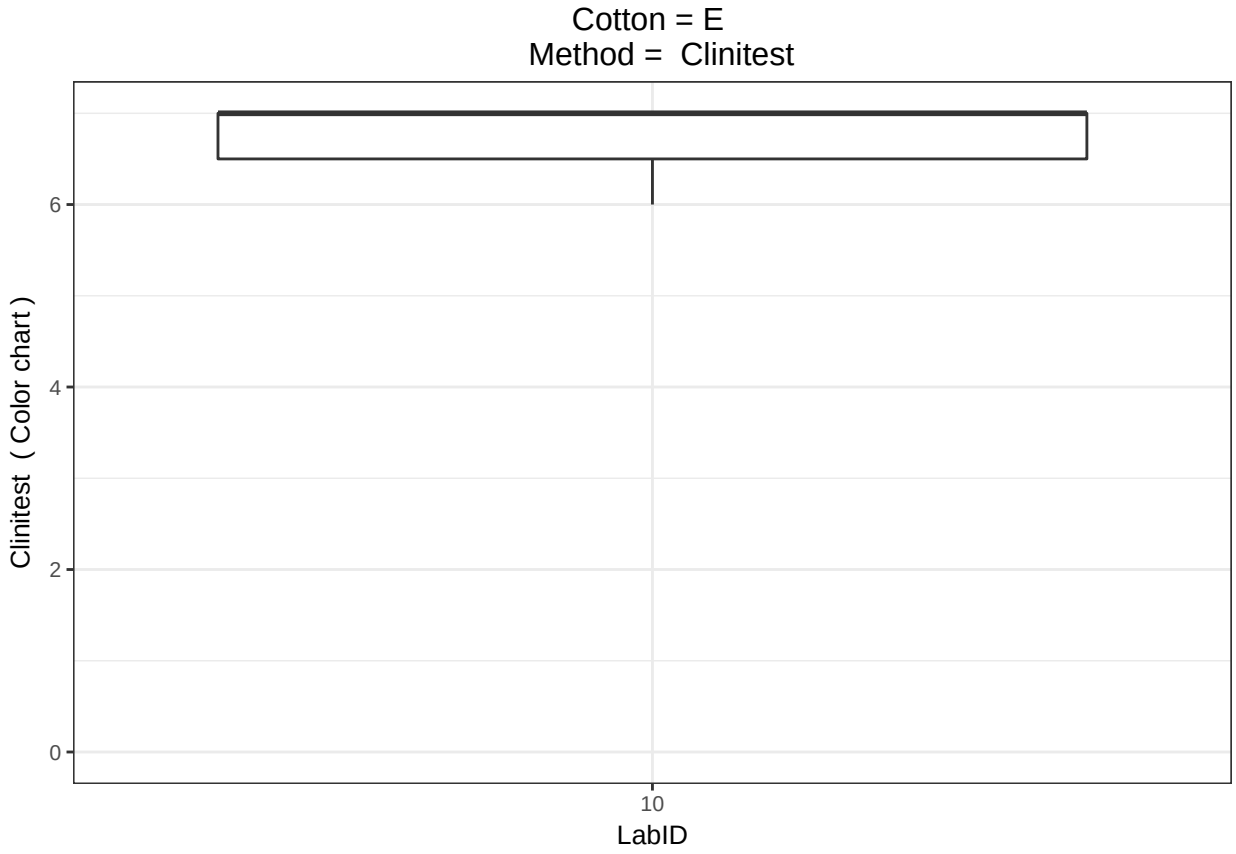

Cotton = D
Method = Quantitative method
Quantitative method (Percent)
1.25
1.00
0.75
0.50
0.25
0.00
100
LabID

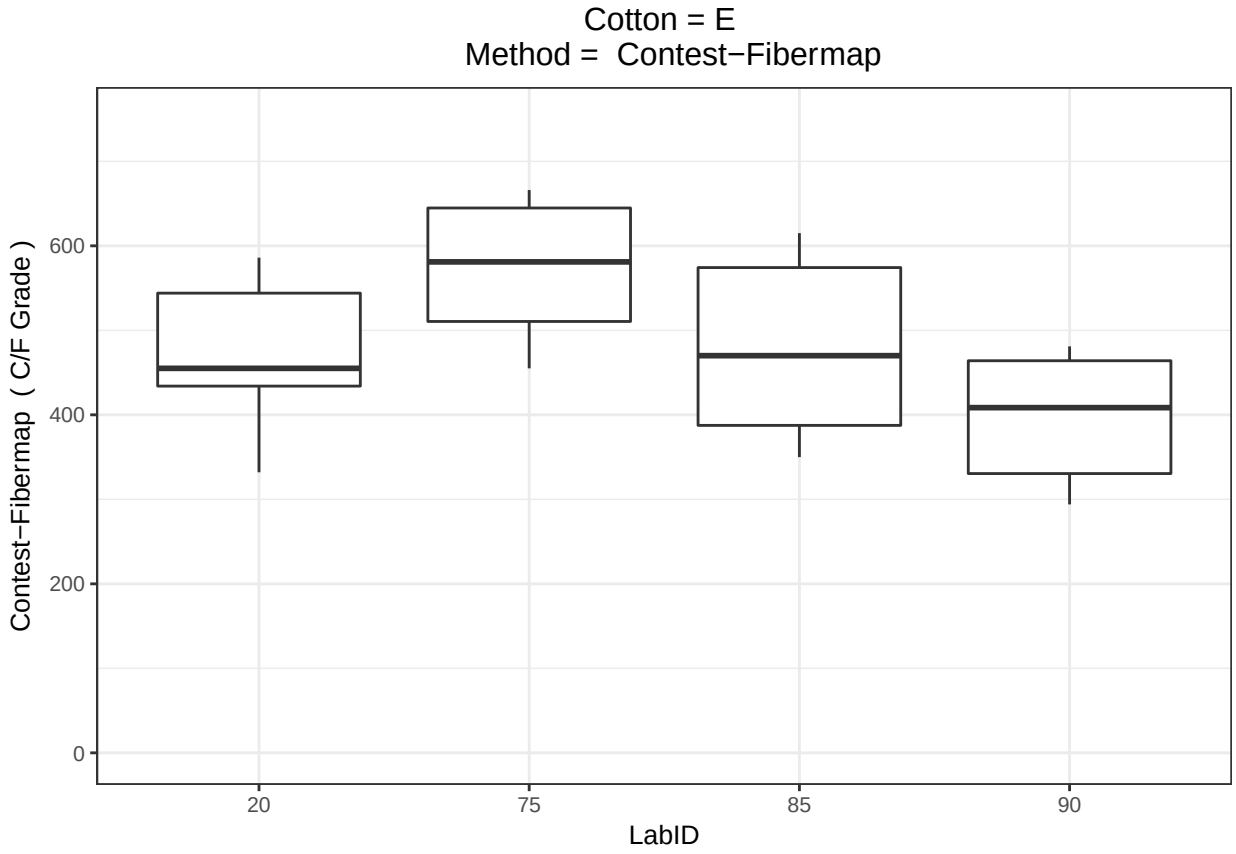

Cotton = D
Method = Reactive Spray
Reactive Spray (Spray Grade)
8
6
4
2
0
15
LabID

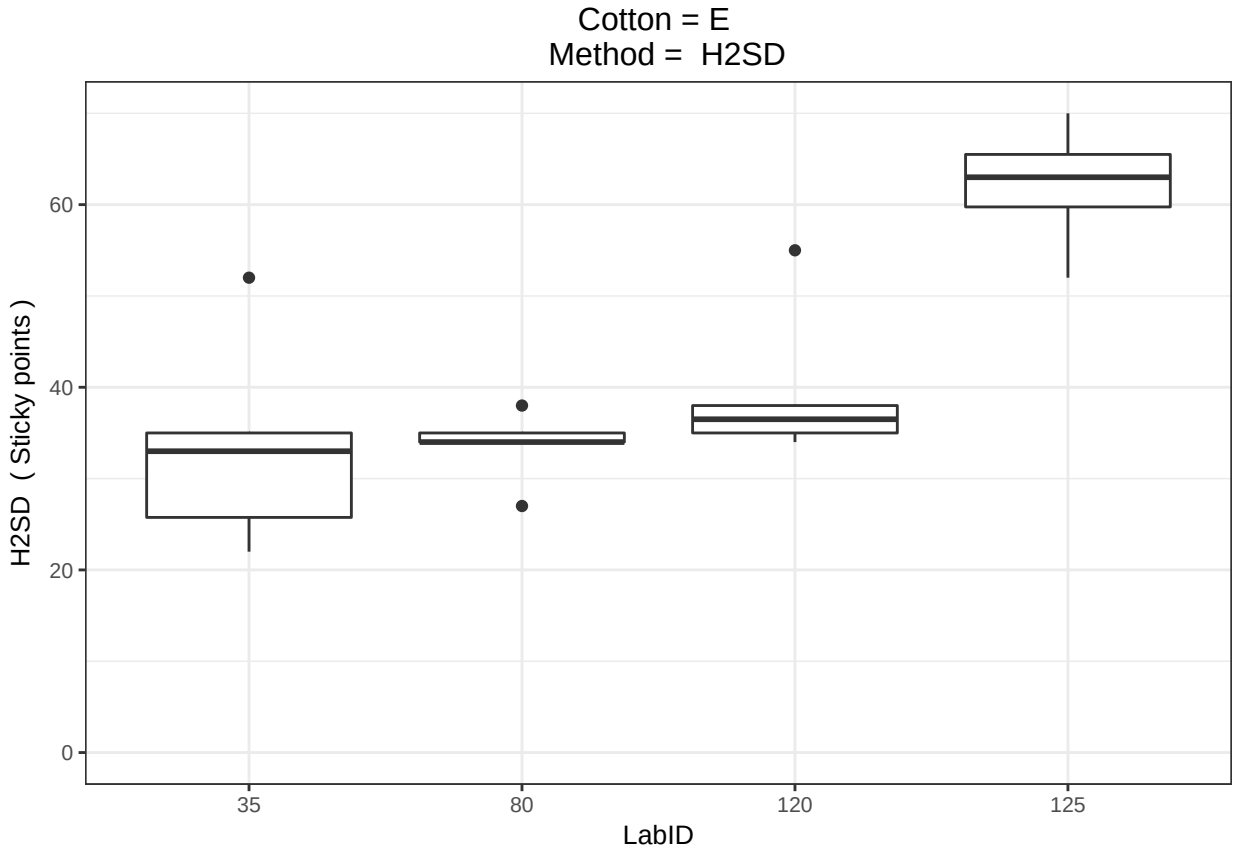

Cotton = D
Method = SCT
SCT (Sticky points)
150
100
50
0
5
30
40
45
55
60
70
110
155
LabID

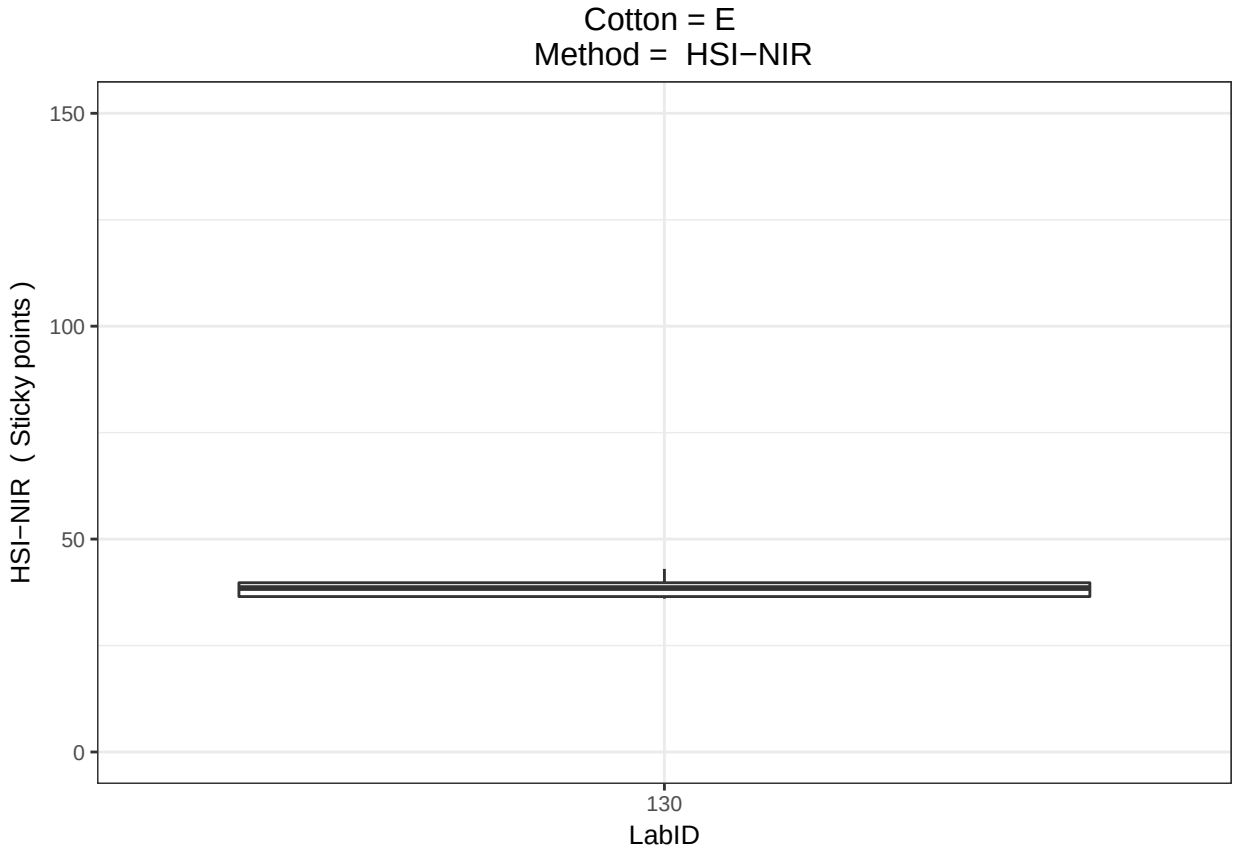
Boxplots for Cotton E

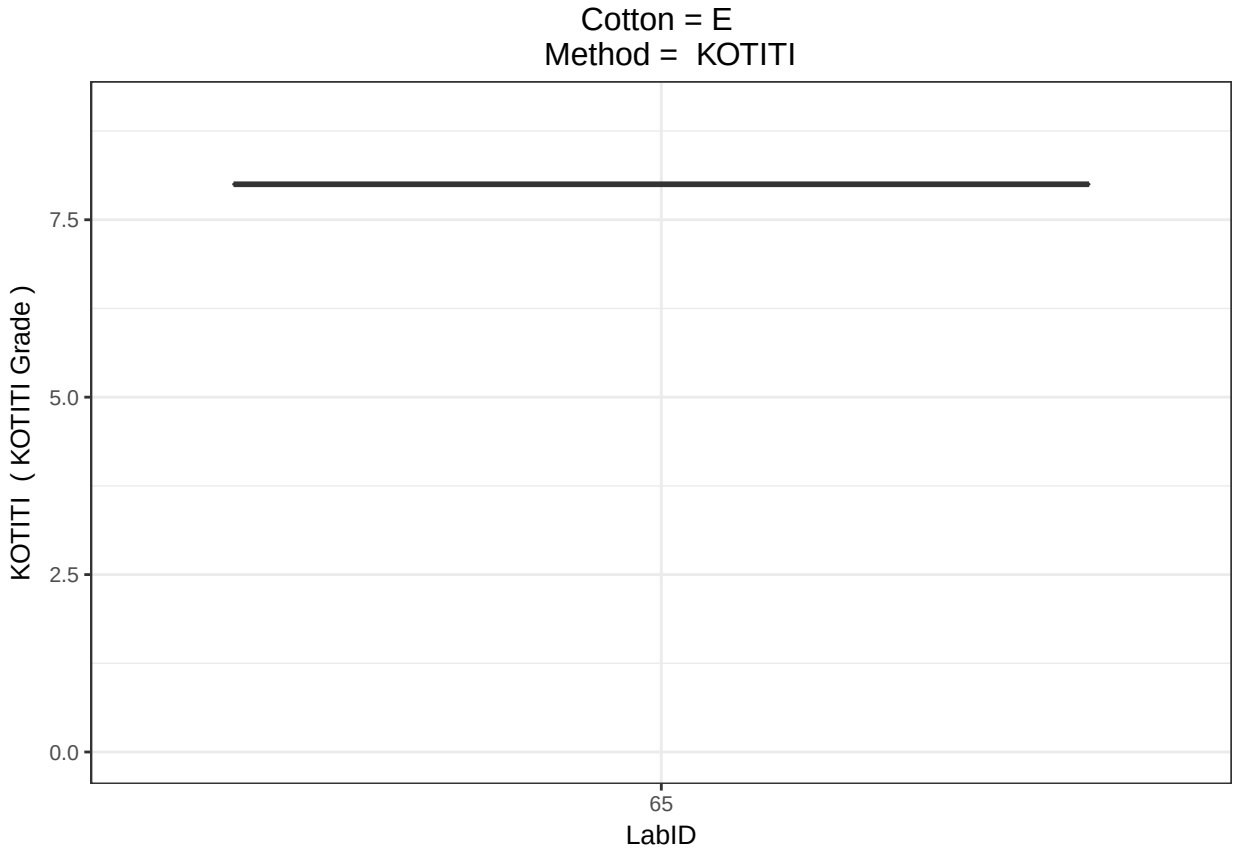


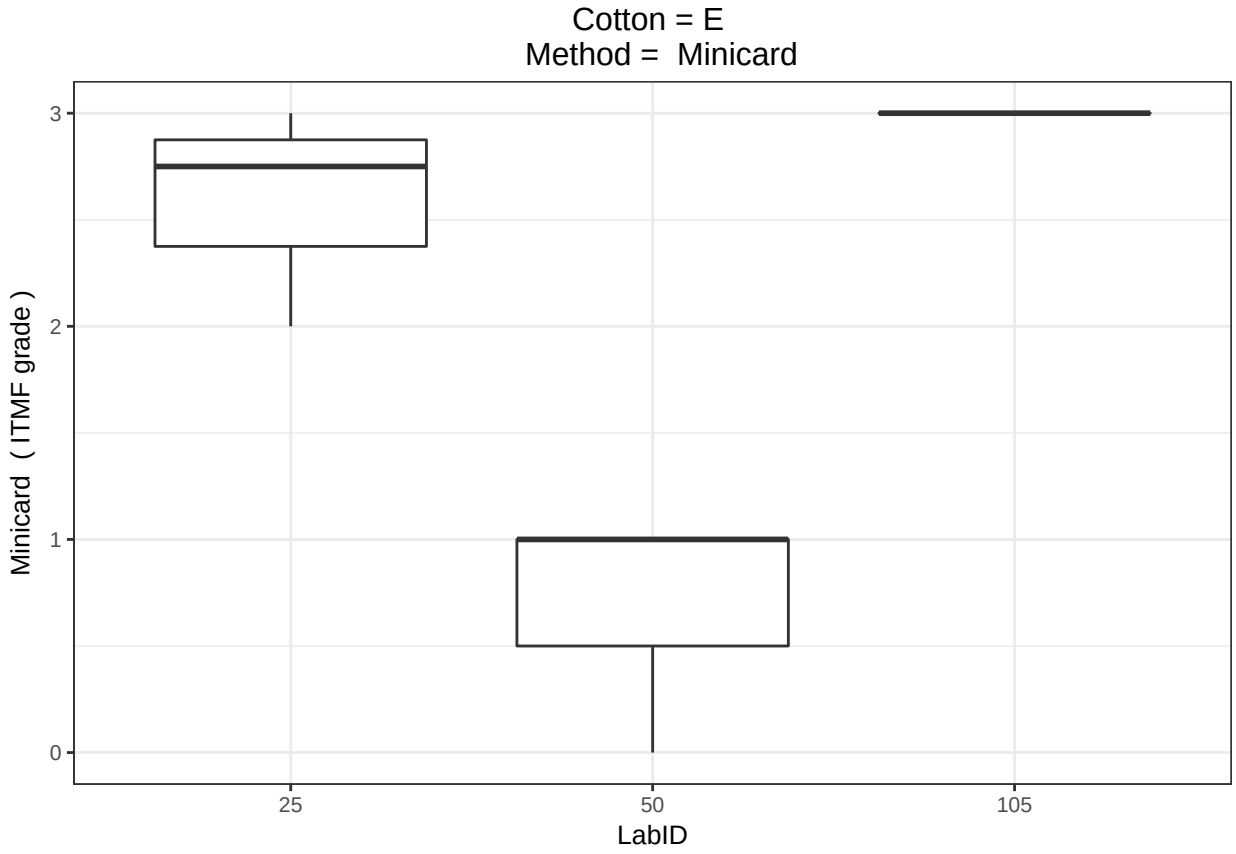

Cotton = E
Method = Clinitest
Clinitest (Color chart)
6
4
2
0
10
LabID

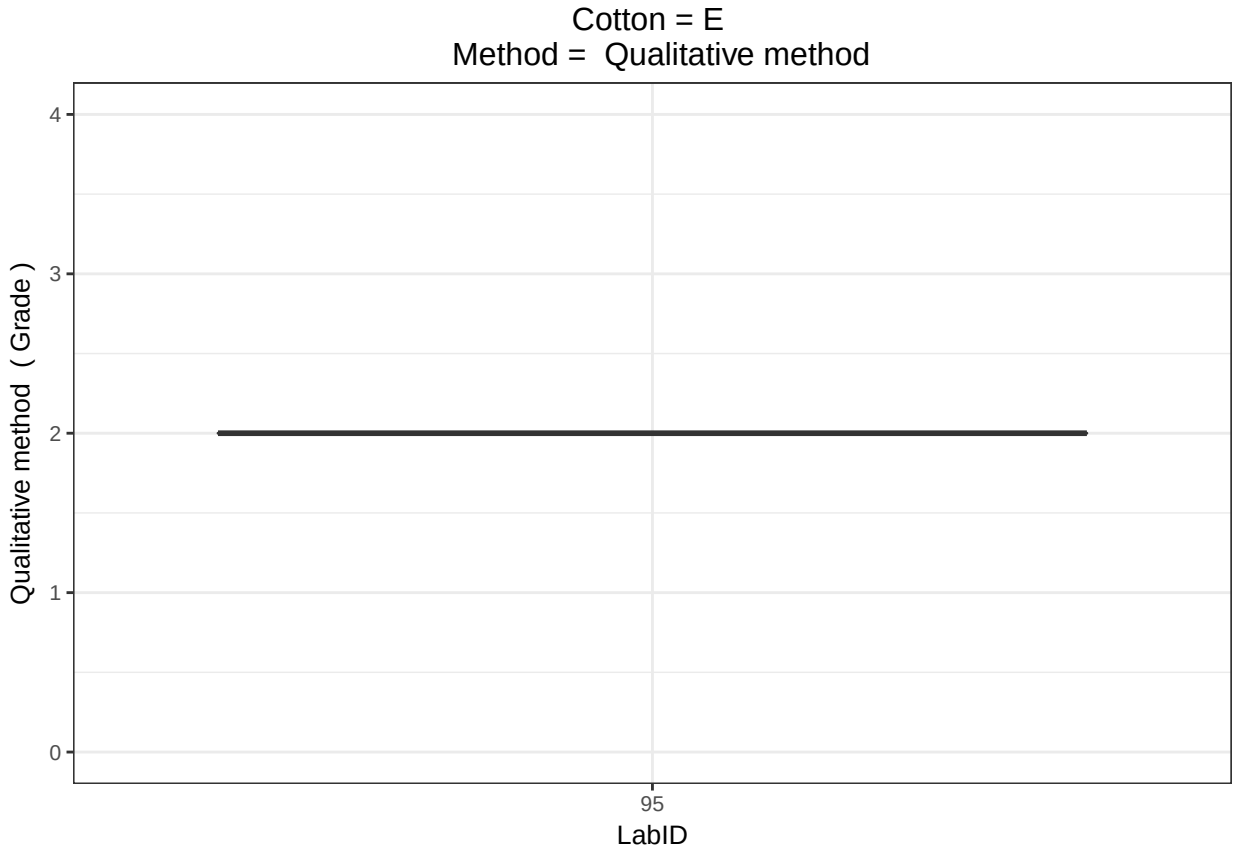

Cotton = E
Method = Contest−Fibermap
Contest−Fibermap (C/F Grade)
600
400
200
0
20
75
85
90
LabID

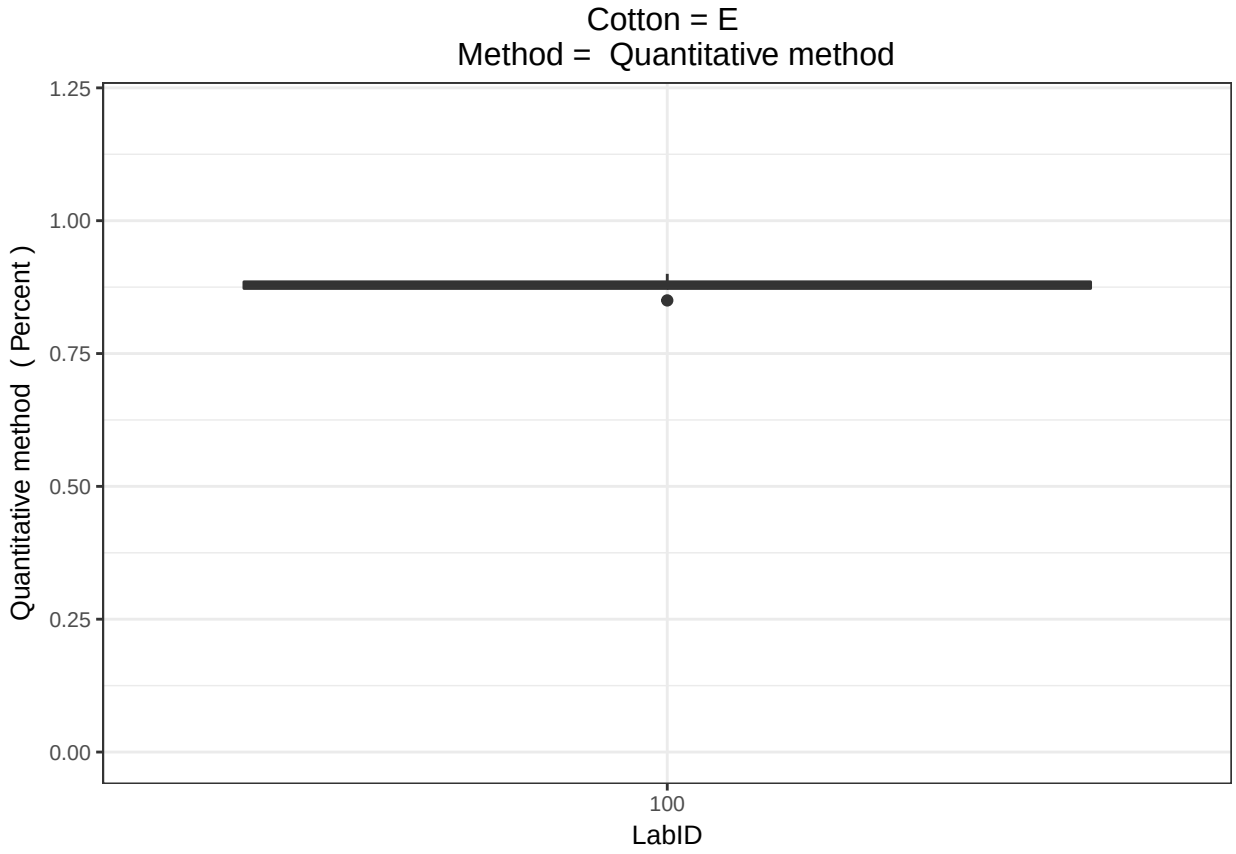

Cotton = E
Method = H2SD
H2SD (Sticky points)
0
20
40
60
35
80
120
125
LabID

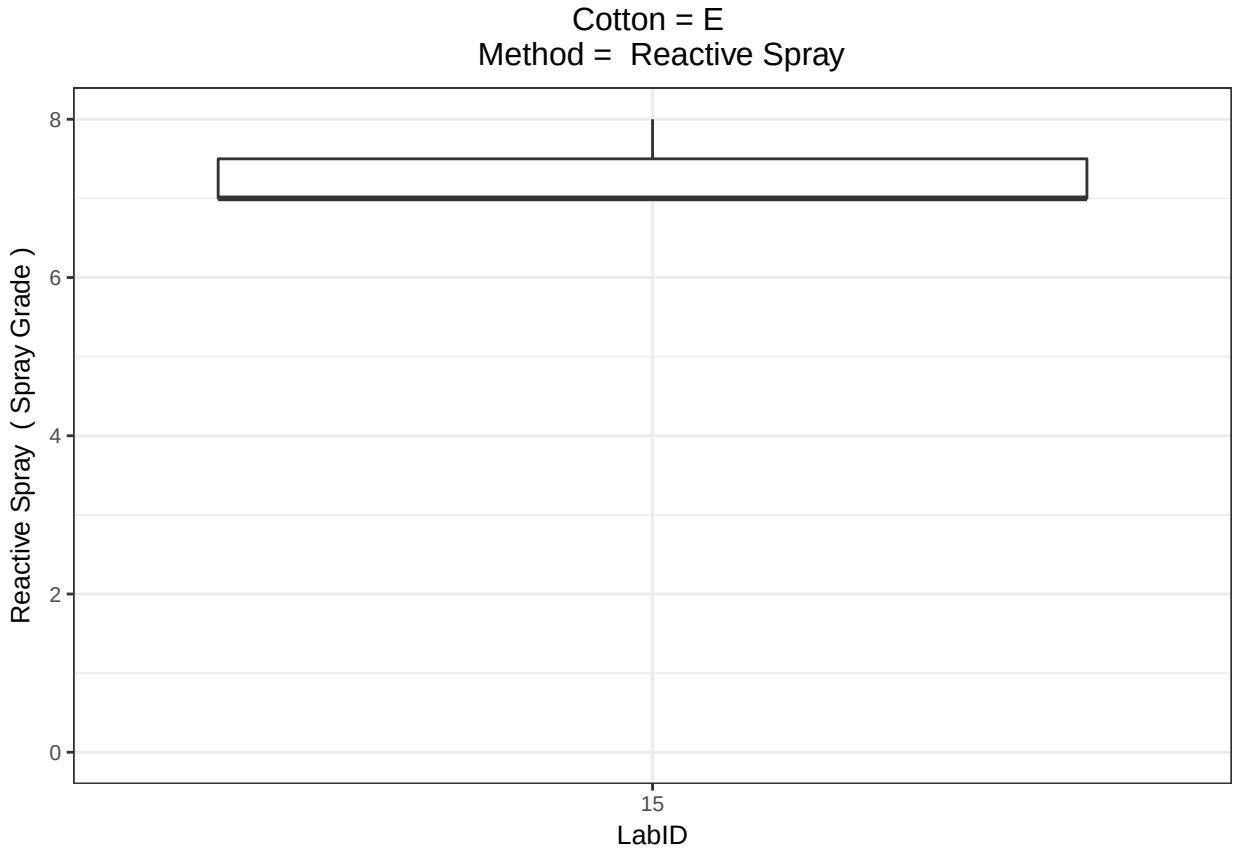

Cotton = E
Method = HSI−NIR
150
100
50
0
HSI−NIR (Sticky points)
130
LabID

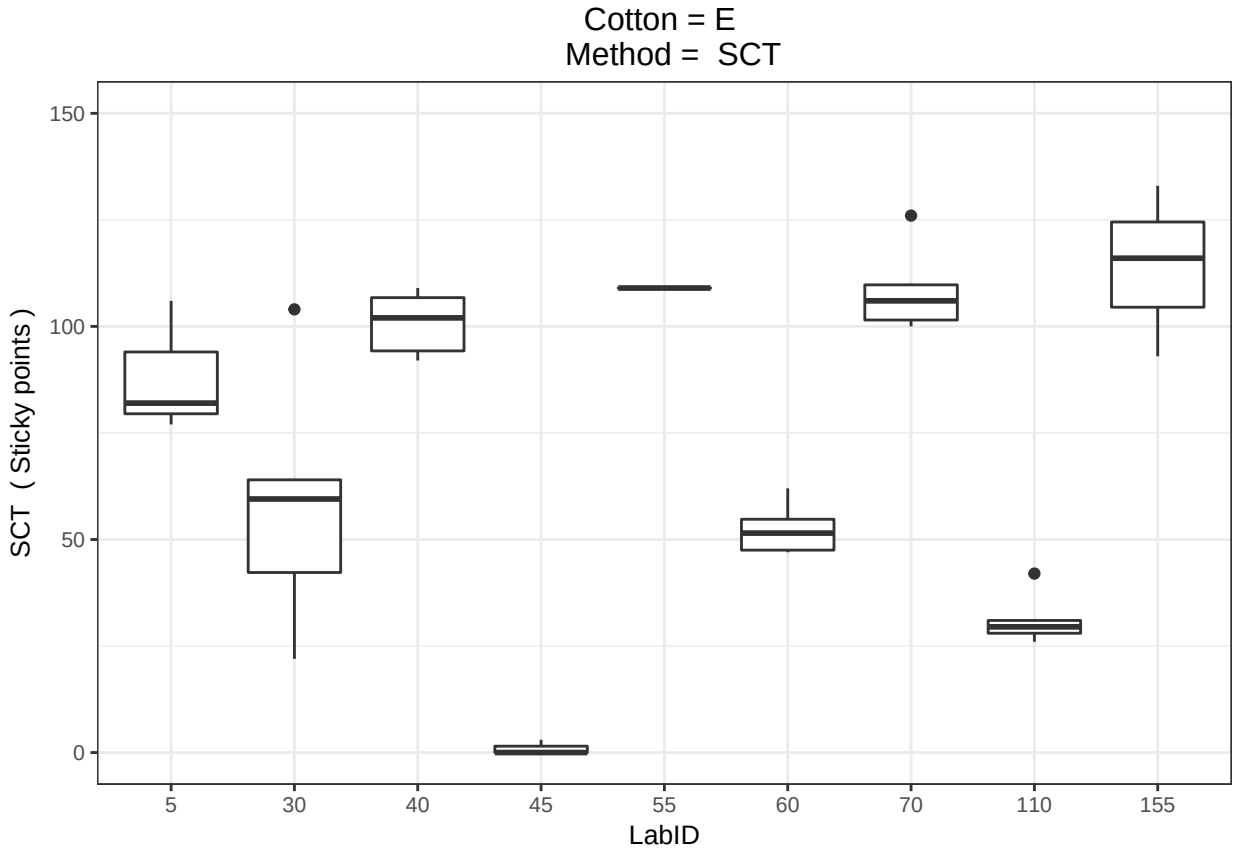

Cotton = E
Method = KOTITI
KOTITI (KOTITI Grade)
7.5
5.0
2.5
0.0
65
LabID


Cotton = E
Method = Minicard
Minicard (ITMF grade)
3
2
1
0
25
50
105
LabID

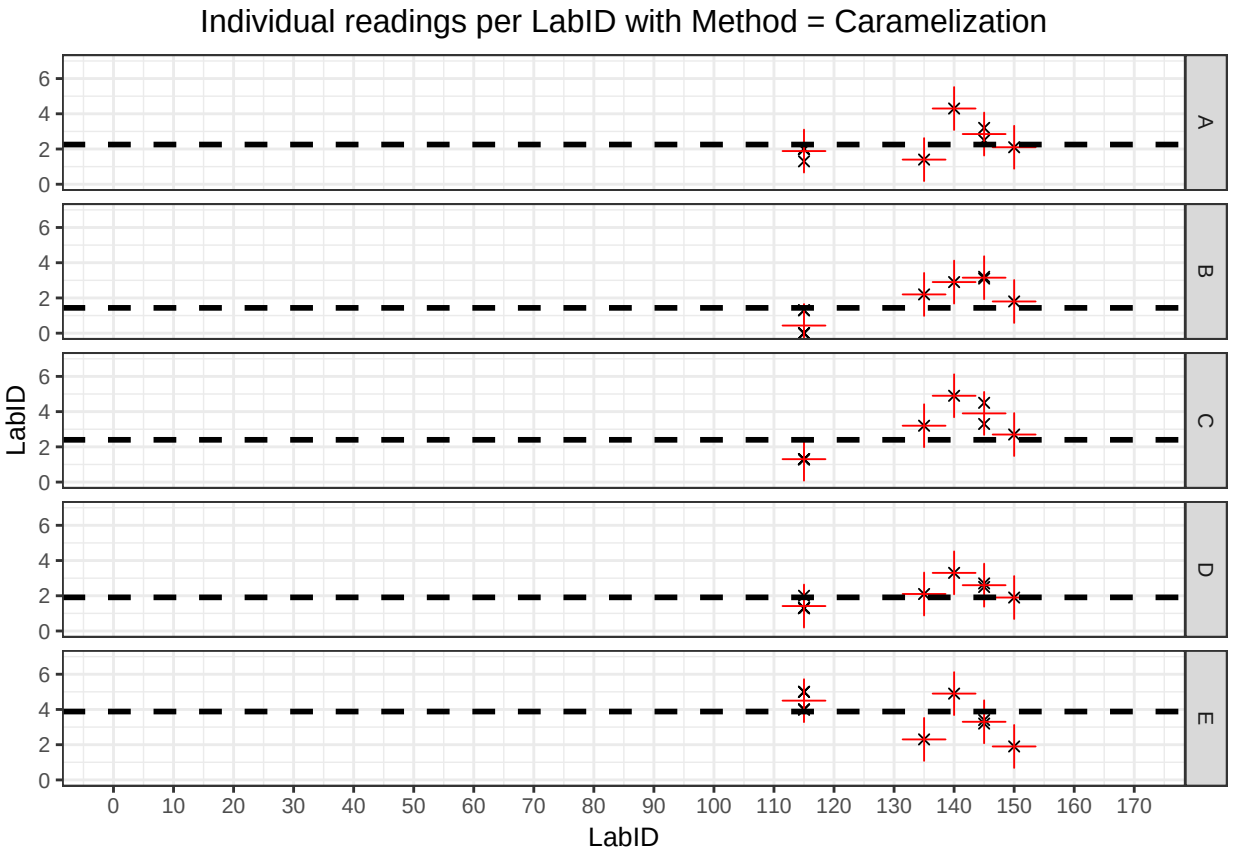

Cotton = E
Method = Qualitative method
Qualitative method (Grade)
4
3
2
1
0
95
LabID


Cotton = E
Method = Quantitative method
1.25
1.00
0.75
0.50
0.25
0.00
Quantitative method (Percent)
100
LabID


Cotton = E
Method = Reactive Spray
Reactive Spray (Spray Grade)
8
6
4
2
0
15
LabID


Cotton = E
Method = SCT
SCT (Sticky points)
150
100
50
0
5
30
40
45
55
60
70
110
155
LabID

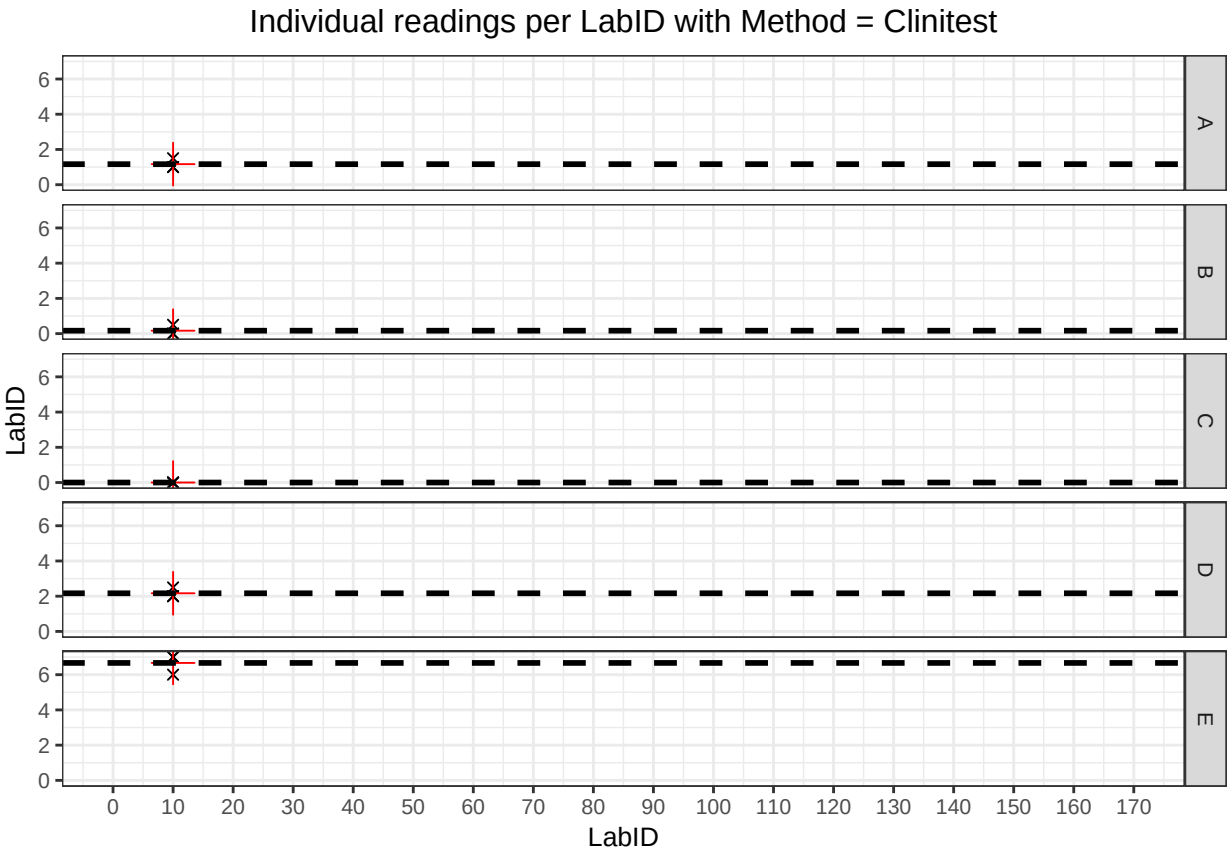
Charts of individual readings per Method and LabID for each cotton [4]

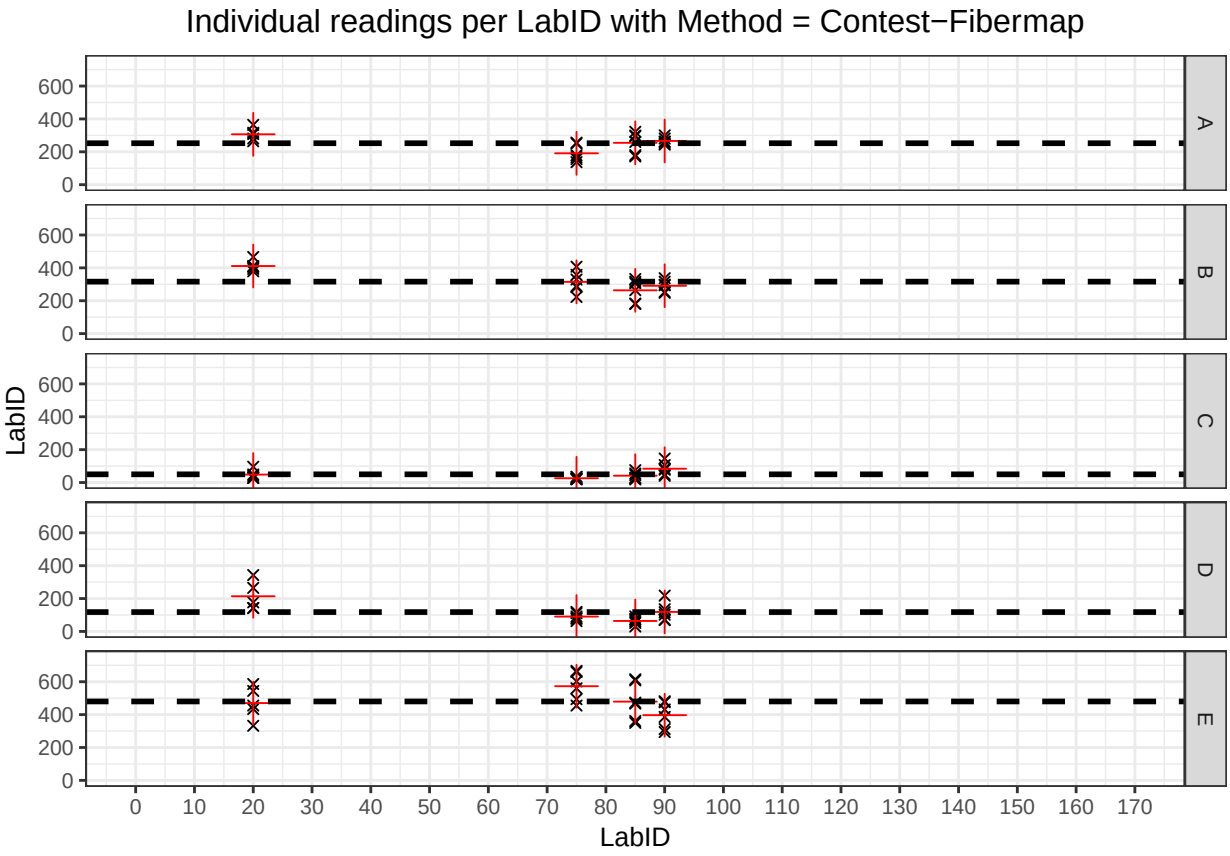


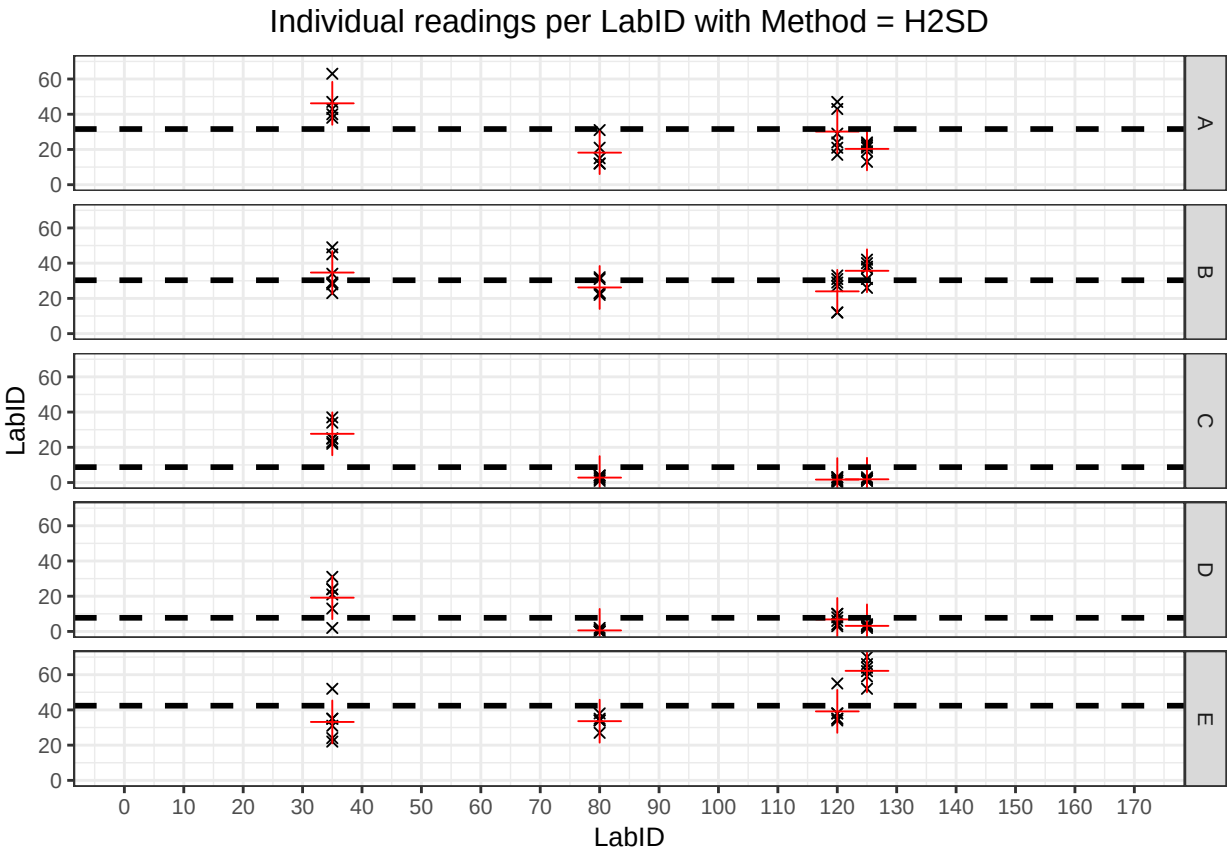
pdf 2

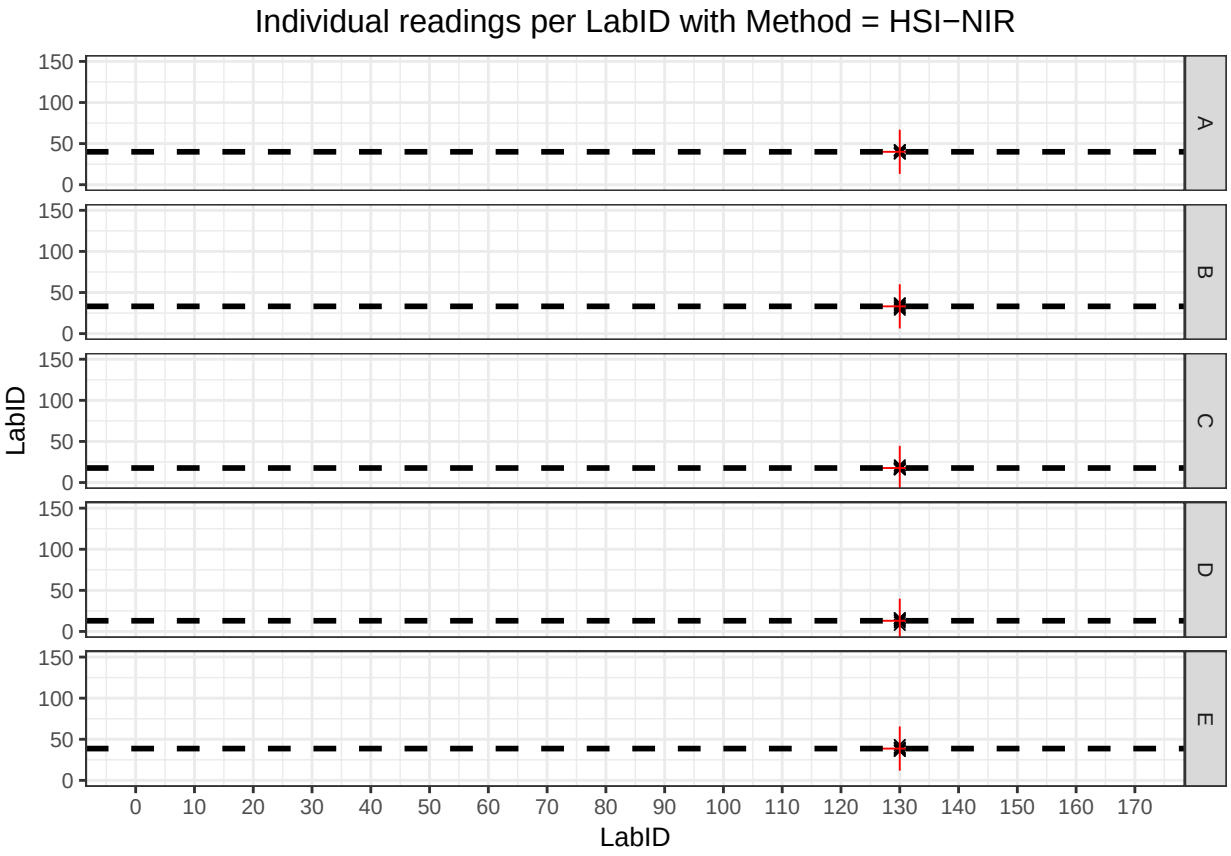
[4] Footnote

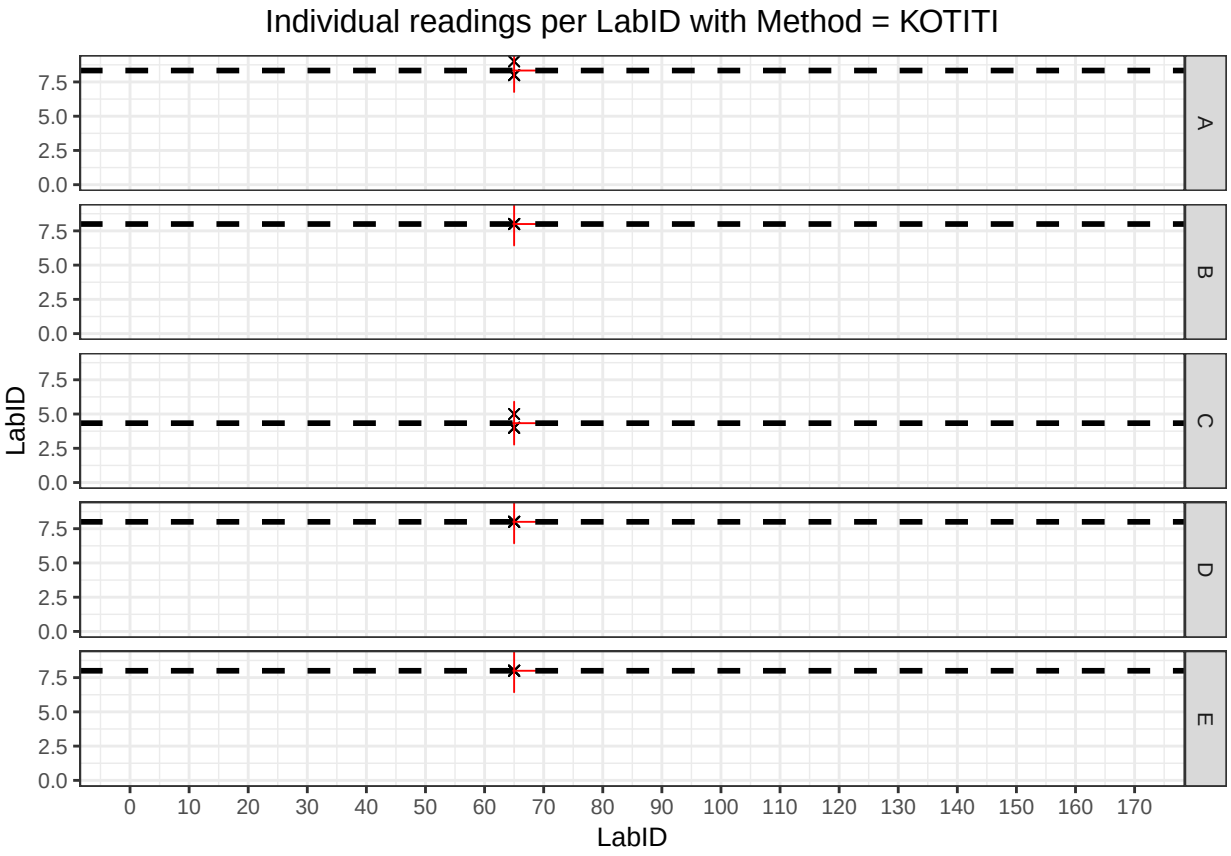
* NA excluded
* LabID are given in the abscissa axis at the bottom of the chart in the following charts.
* Black dashed line = Method GrandMean per cotton.
* Red + = Laboratory mean for the given method and for the given cotton.
* Black x = Laboratory individual reading for the given method and for the given cotton.

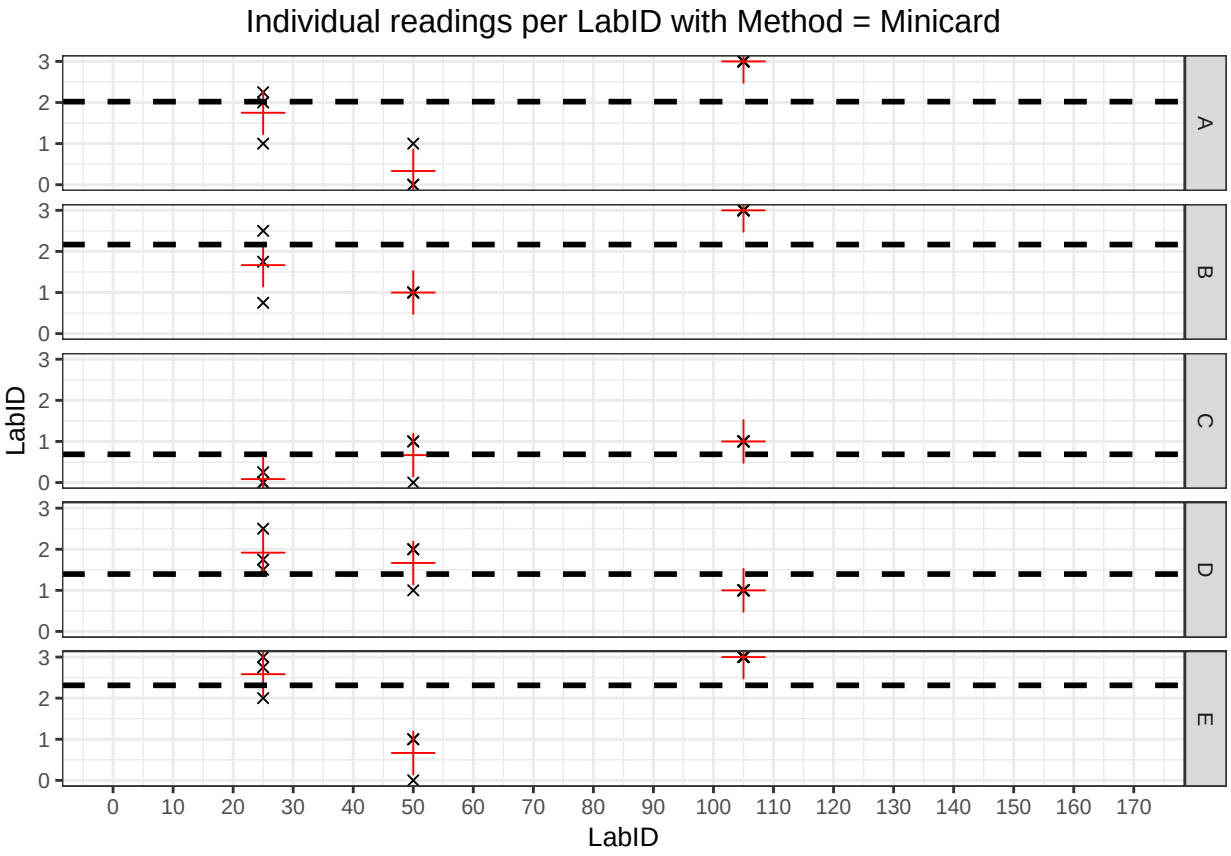

Individual readings per LabID with Method = Clinitest
LabID
LabID
A
B
C
D
E
0
2
4
6
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170

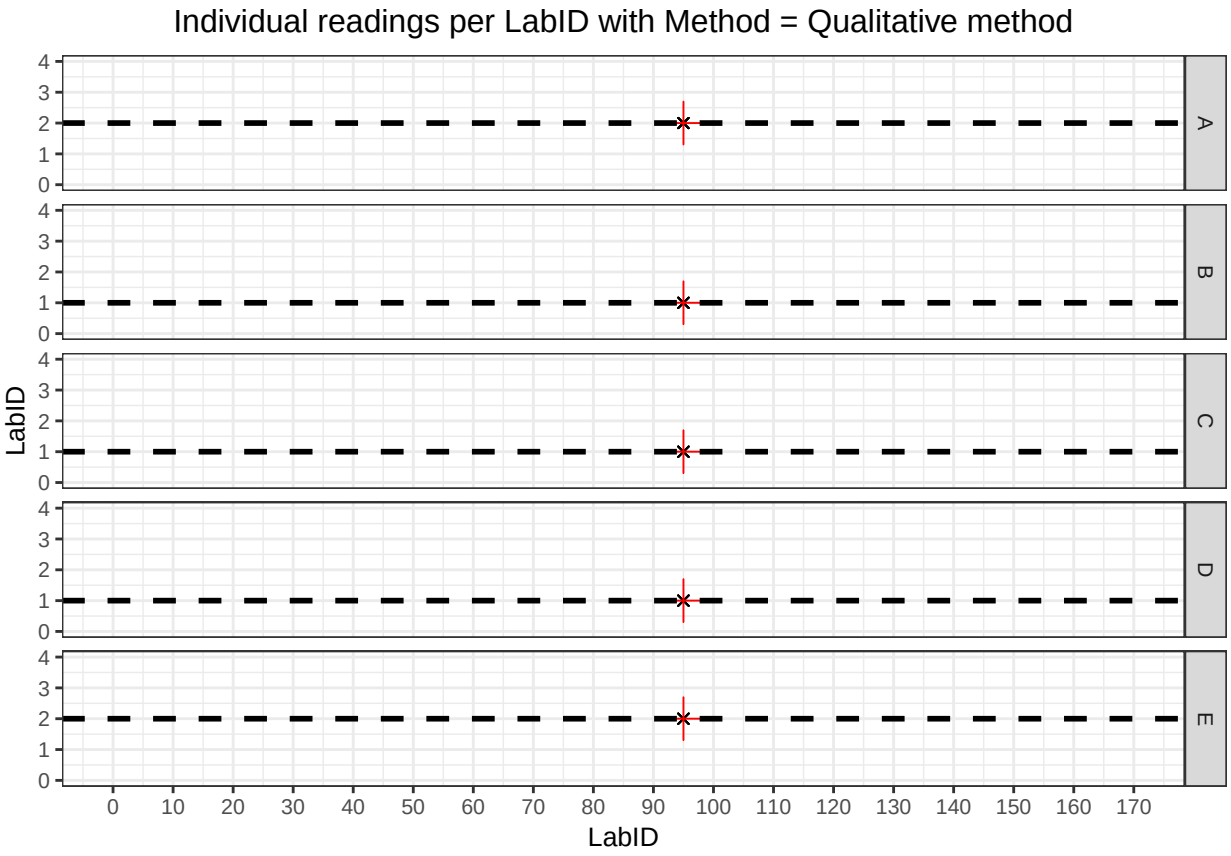

Individual readings per LabID with Method = Contest−Fibermap
LabID
600
400
200
0
A
B
C
D
E
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
LabID

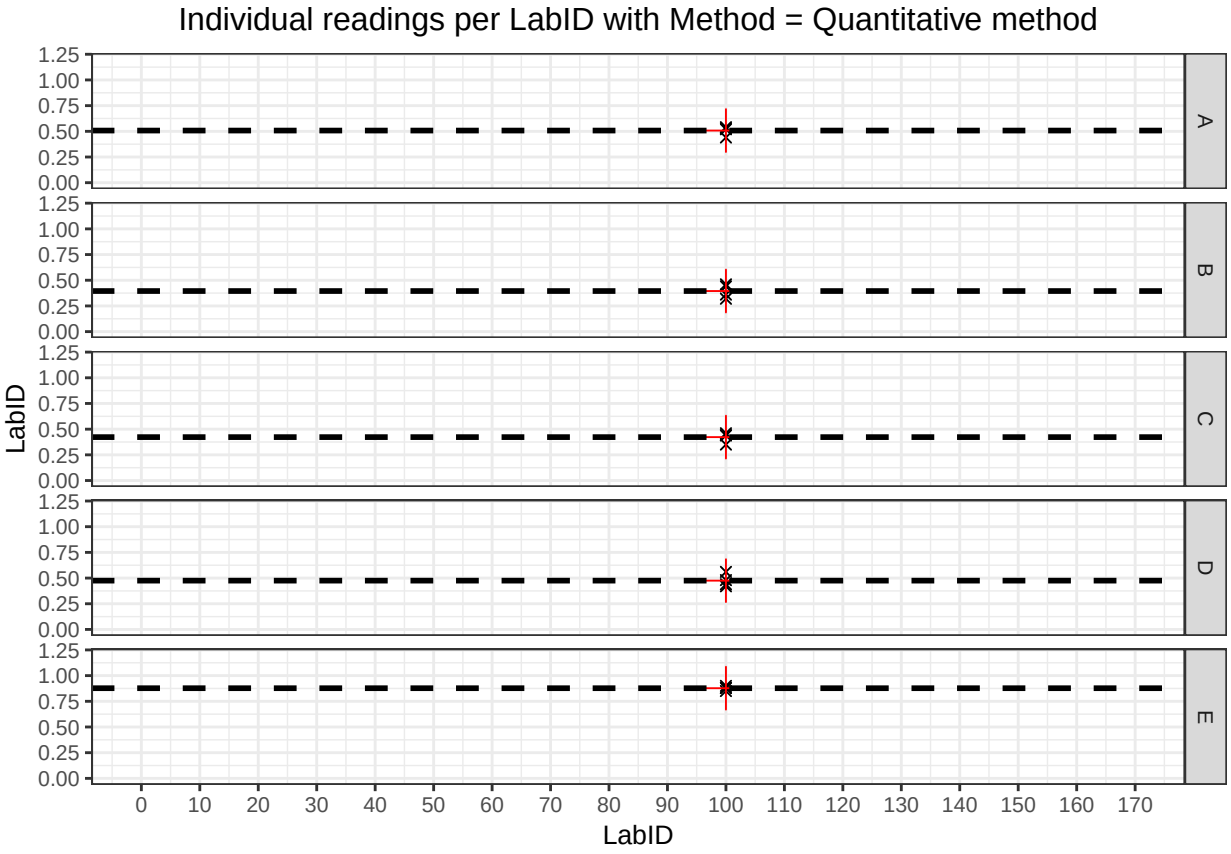

Individual readings per LabID with Method = H2SD
LabID
LabID
A
B
C
D
E
0
20
40
60
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170

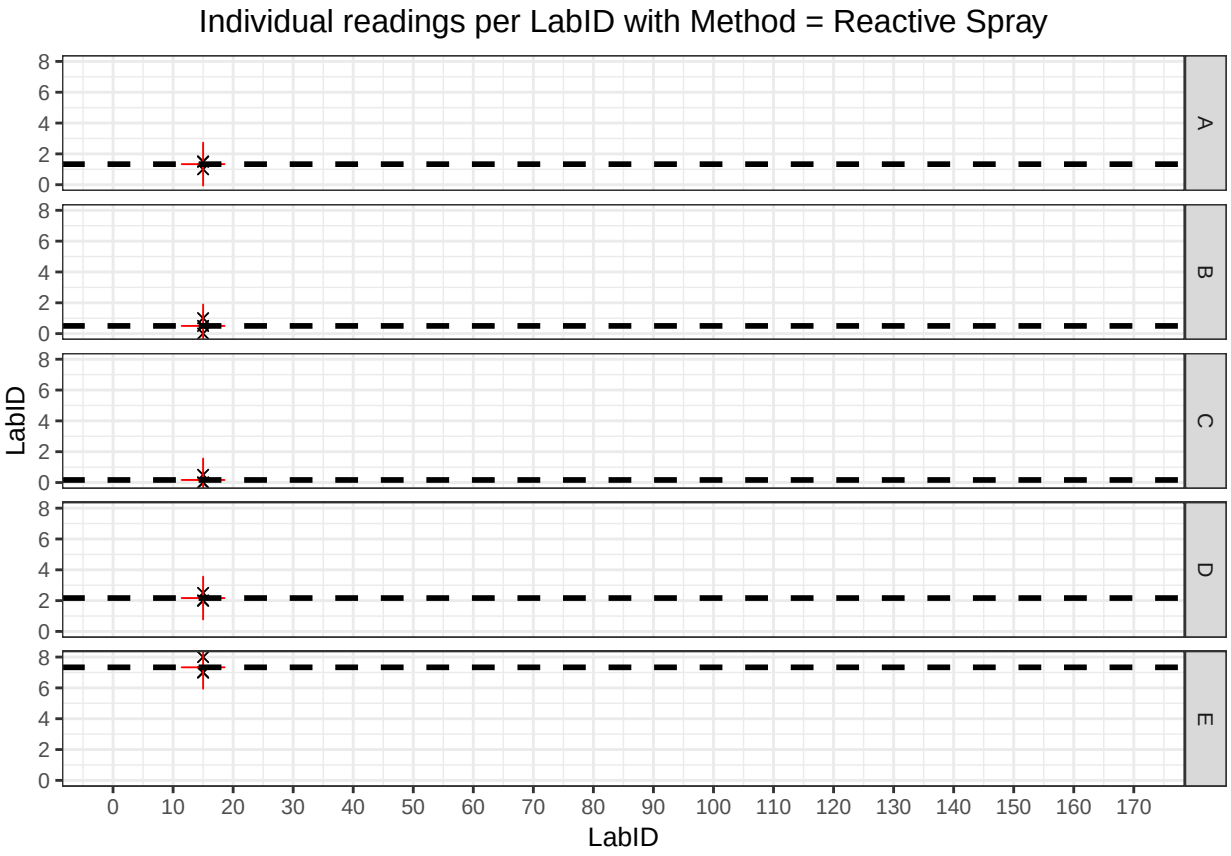

Individual readings per LabID with Method = HSI−NIR
LabID
150
100
50
0
A
B
C
D
E
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
LabID

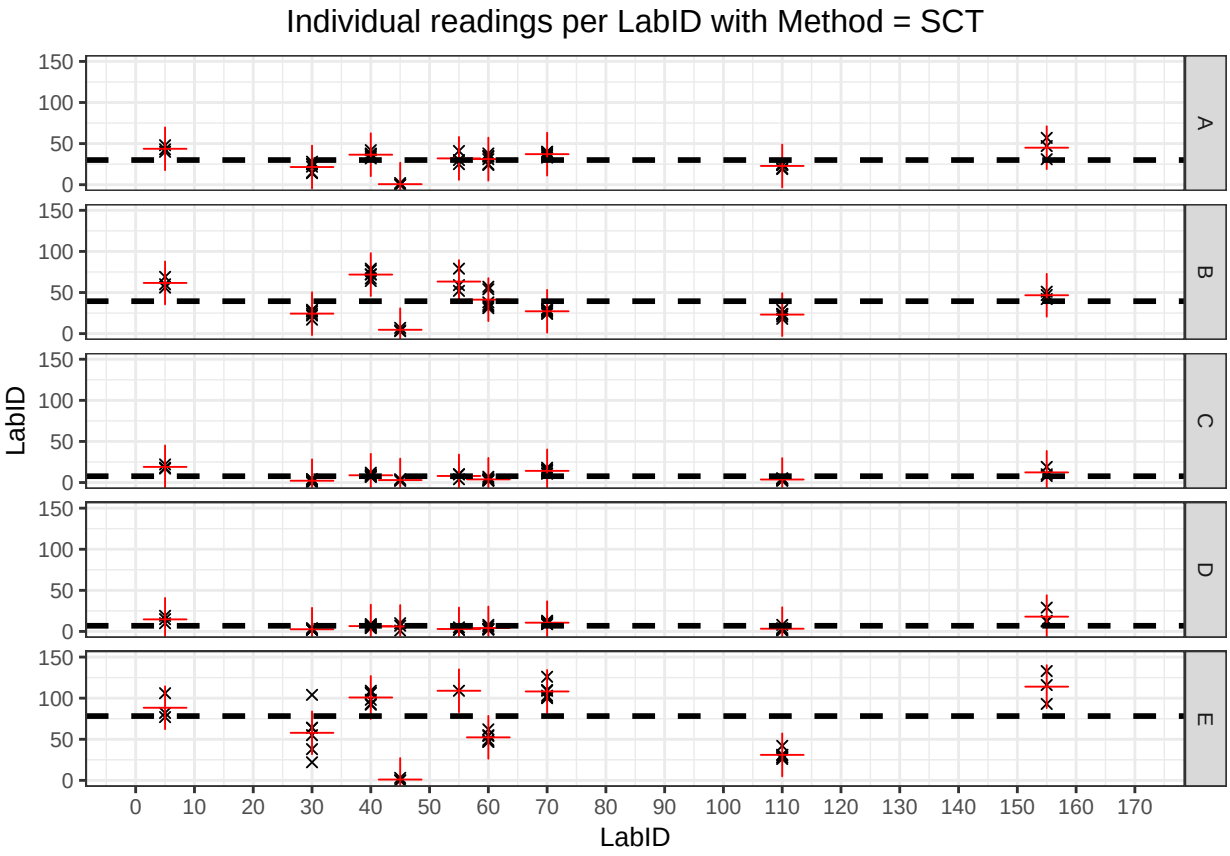

Individual readings per LabID with Method = KOTITI
LabID
7.5
5.0
2.5
0.0
A
B
C
D
E
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
LabID


Individual readings per LabID with Method = Minicard
LabID
LabID
A
B
C
D
E
0
1
2
3
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170


Individual readings per LabID with Method = Qualitative method
LabID
LabID
A
B
C
D
E
0
1
2
3
4
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170

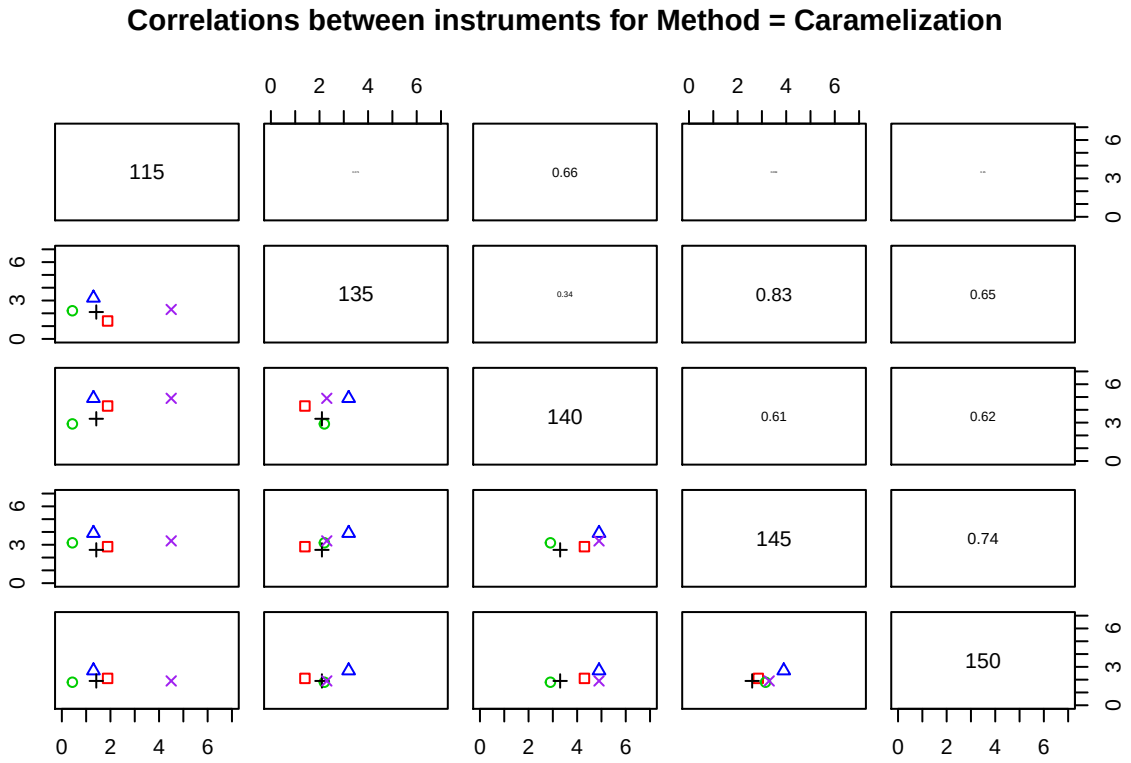

Individual readings per LabID with Method = Quantitative method
LabID
1.25
1.00
0.75
0.50
0.25
0.00
A
B
C
D
E
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
LabID


Individual readings per LabID with Method = Reactive Spray
LabID
LabID
A
B
C
D
E
0
2
4
6
8
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170


Individual readings per LabID with Method = SCT
LabID
LabID
A
B
C
D
E
0
50
100
150
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170

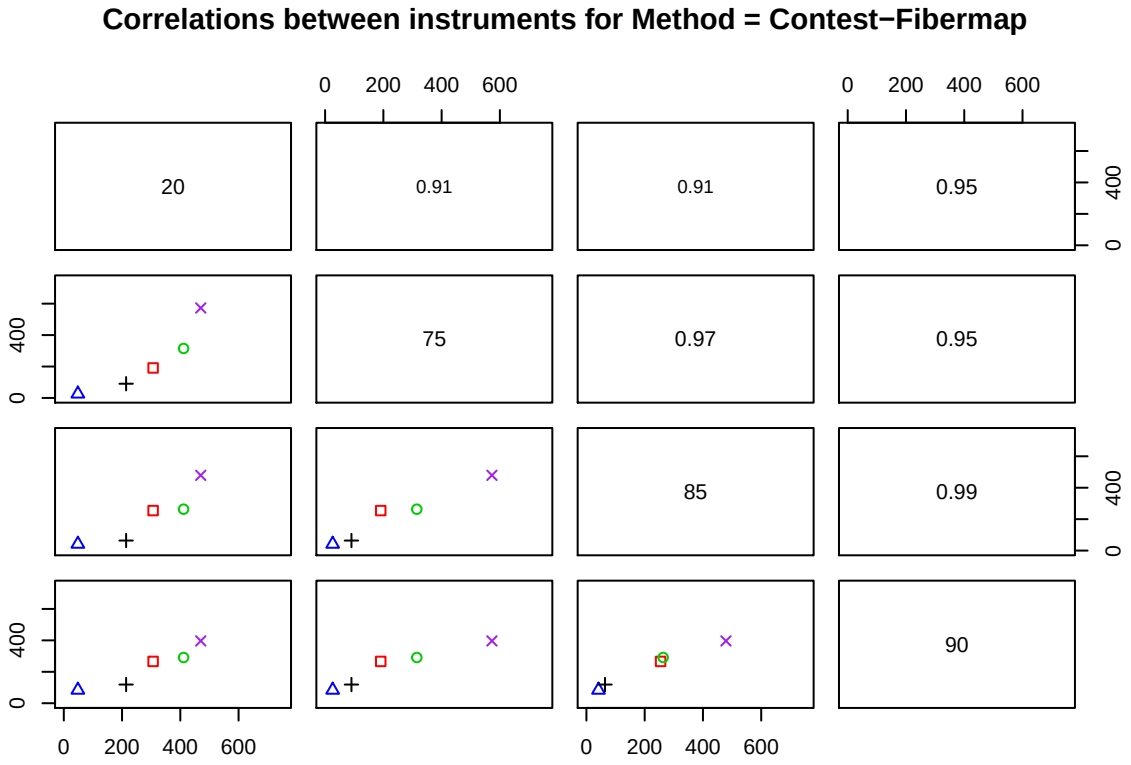
Correlation charts and correlation values between LabID using a same Method for all cottons [5]

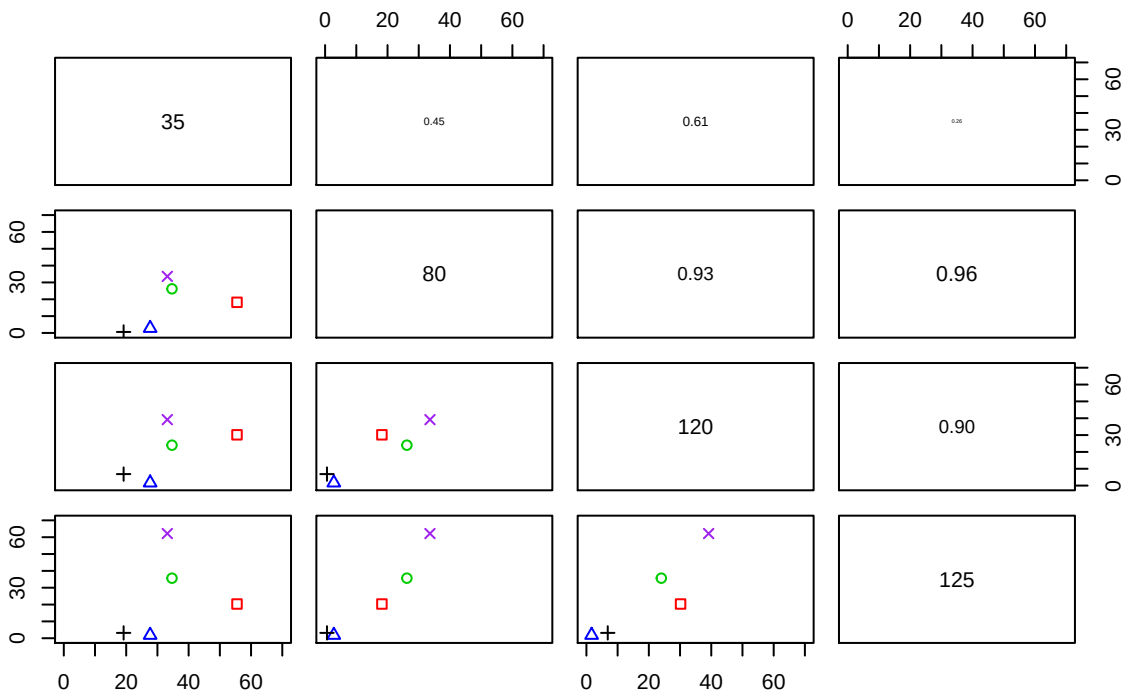
A correlation matrix of charts is provided only when two or more instruments were used for a given method.

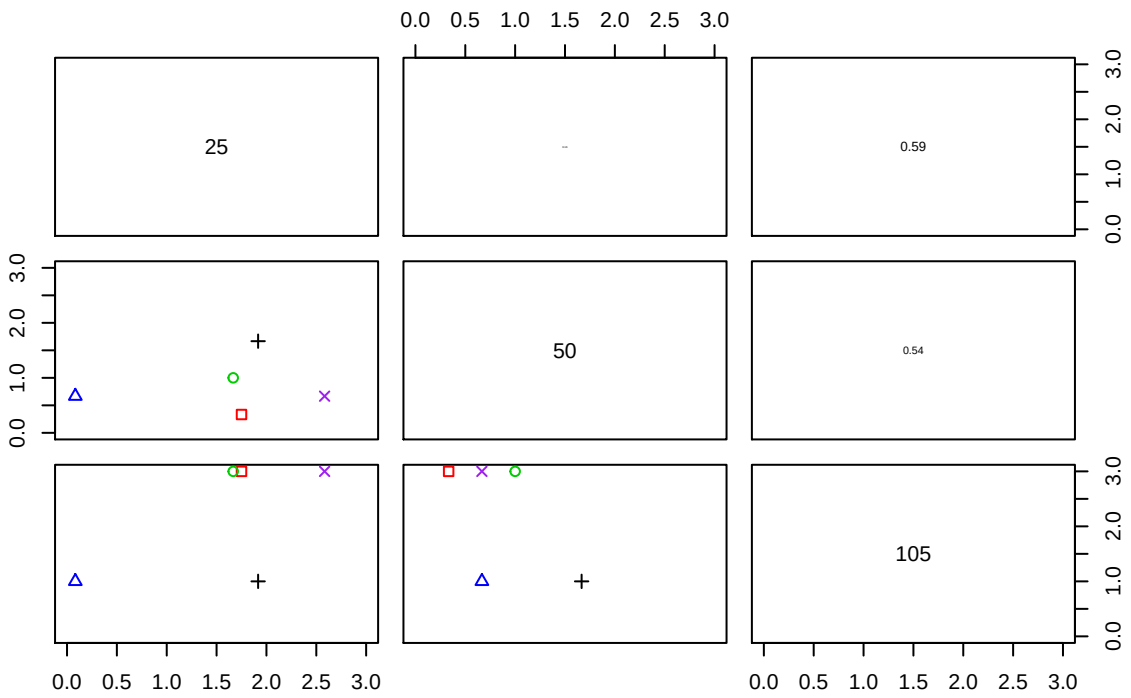


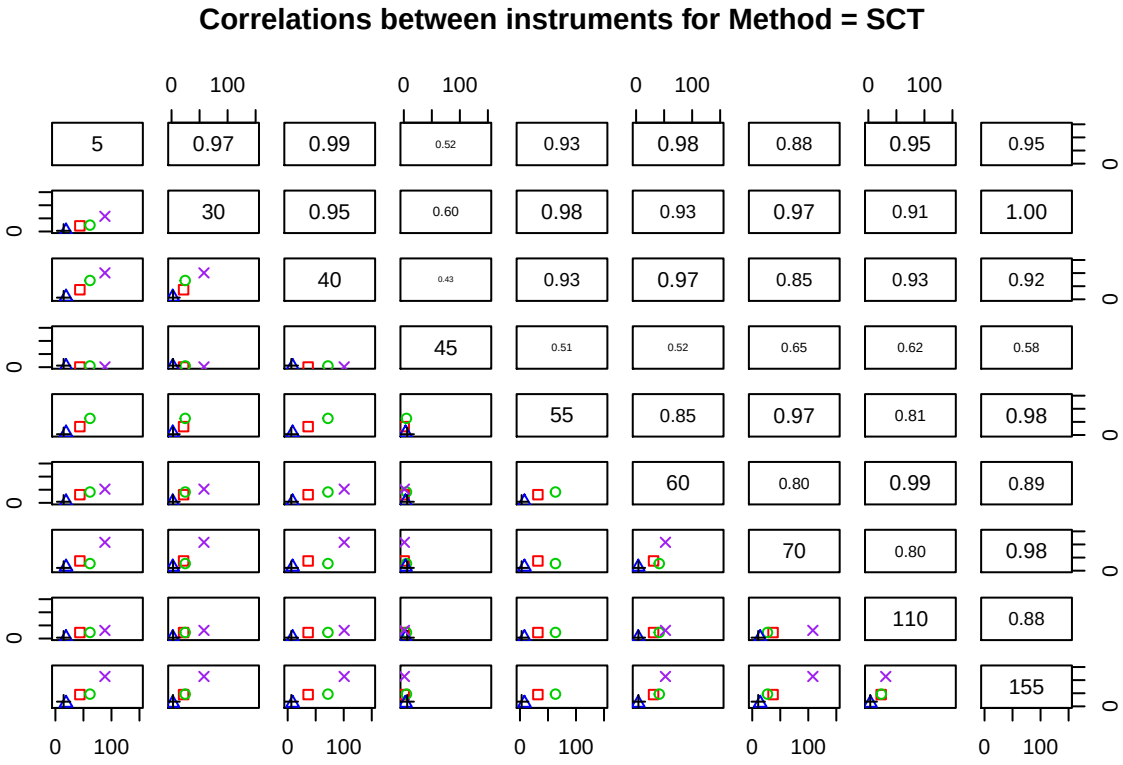
[5]Footnote

* Based on Means of available results (NA excluded)
* LabIds are given in the diagonal of the matrix.
* Squares in red for Cotton A, rounds in green for Cotton B, triangles in blue for Cotton C, + in black for cotton D, and x in purple for cotton E.
* The lower left corner of the matrix provides the correlation charts, while the upper right corner of the matrix provides the corresponding raw correlation coefficients. Higher the correlation coefficient, larger the font size of the corresponding text.


Correlations between instruments for Method = Contest−Fibermap
0
200
400
600
20
0.91
0.91
0.95
75
0.97
0.95
85
0.99
90


Correlations between instruments for Method = H2SD
35
0.45
0.61
0.26
80
0.93
0.96
120
0.90
125
0
20
40
60
0
30
60

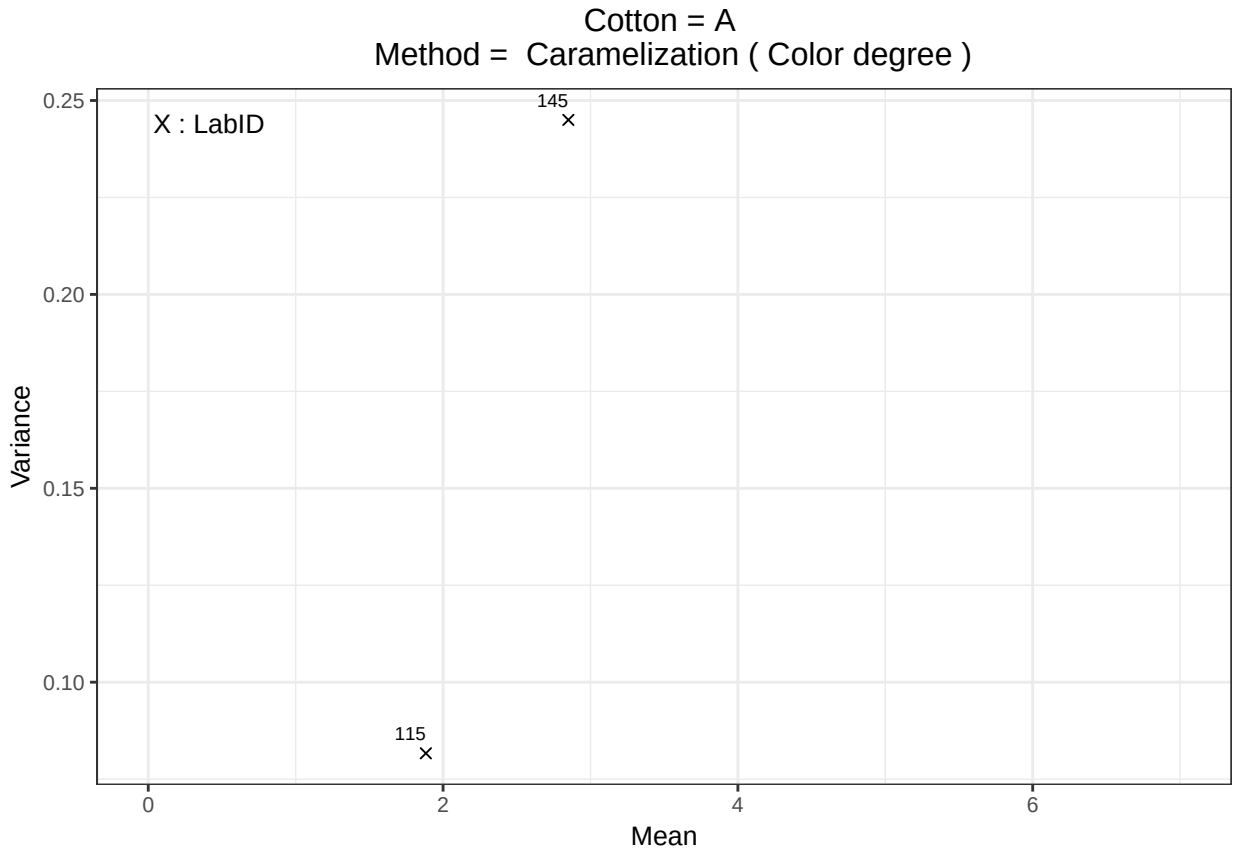

Correlations between instruments for Method = Minicard
25
50
105
0.59
0.54
0.0 0.5 1.0 1.5 2.0 2.5 3.0


Correlations between instruments for Method = SCT
0 100
5
0.97
0.99
0.52
0.93
0.98
0.88
0.95
0.95
30
0.95
0.60
0.98
0.93
0.97
0.91
1.00
40
0.43
0.93
0.97
0.85
0.93
0.92
45
0.51
0.52
0.65
0.62
0.58
55
0.85
0.97
0.81
0.98
60
0.80
0.99
0.89
70
0.80
0.98
110
0.88
155

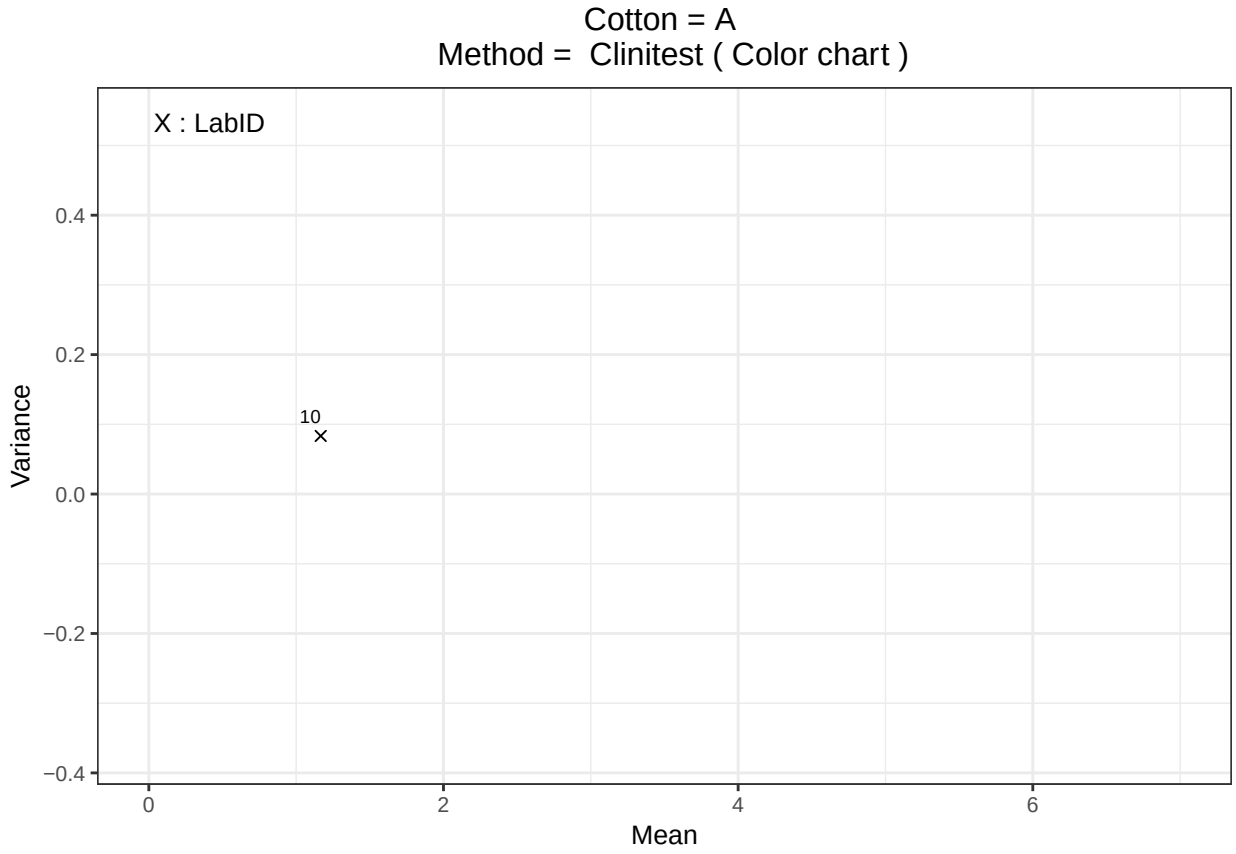
Charts Variance = f(Mean) for each Cotton and Method, taking care of LabIDs

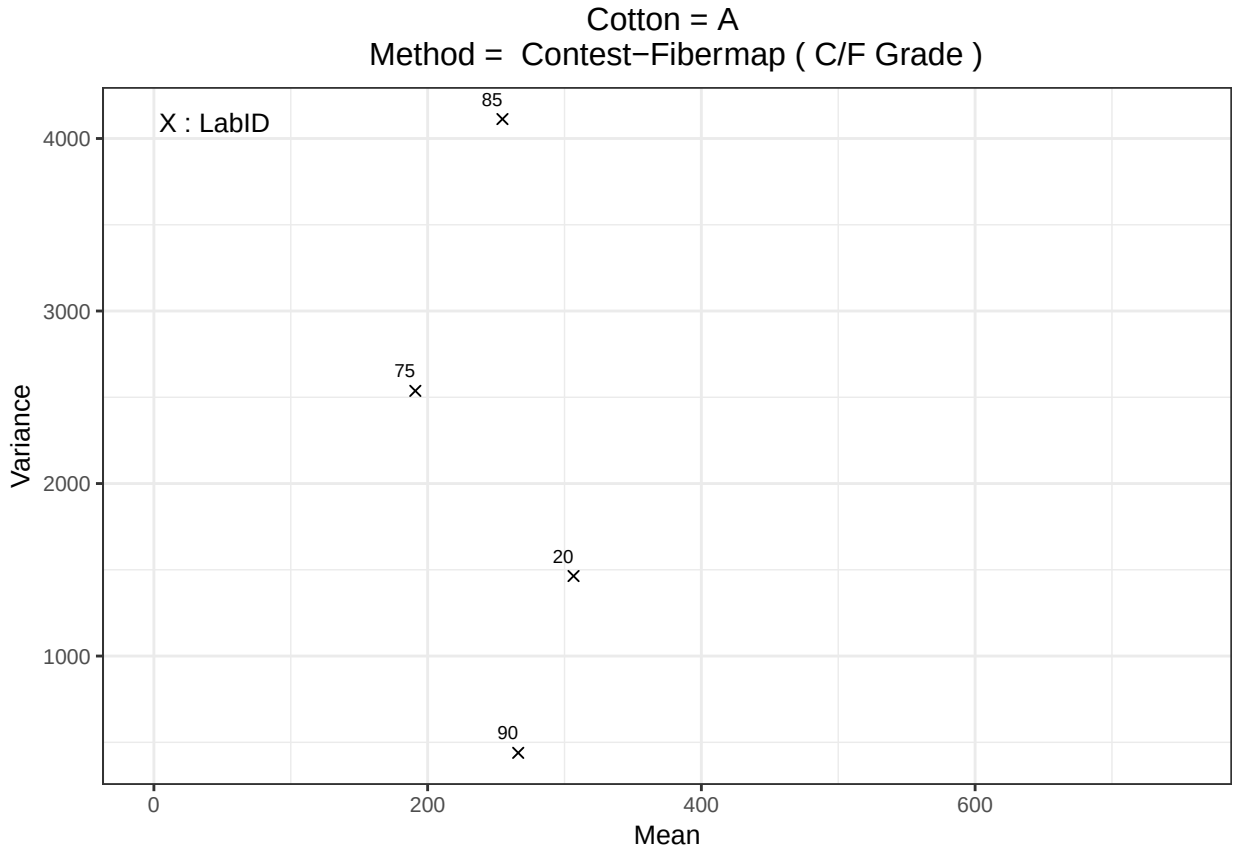
This type of chart is devoted to displaying the ability of laboratories to reproduce themselves for each cotton, based on the n readings (up to six) they provided for each cotton sample. Stickiness has the reputation to be heterogeneously distributed within samples (whatever the efforts we made for homogenizing cotton masses before dispatching representative samples); therefore, if methods are sensitive enough, then a certain level of variance (displayed on the vertical axis in the following charts) is to be seen when the number of measurements exceeds 1 in this test.

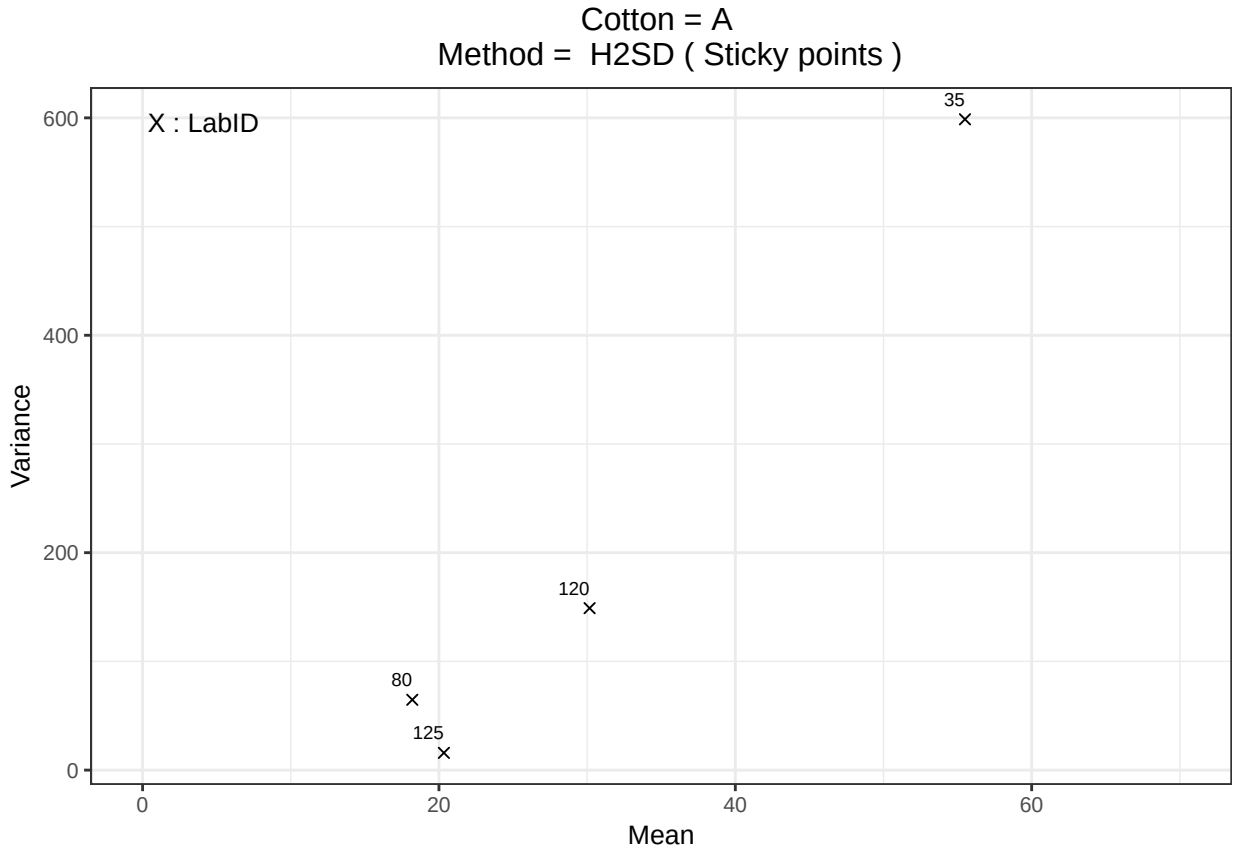
Cotton A : Variance between individual measurements = f(Mean) for all concerned labs

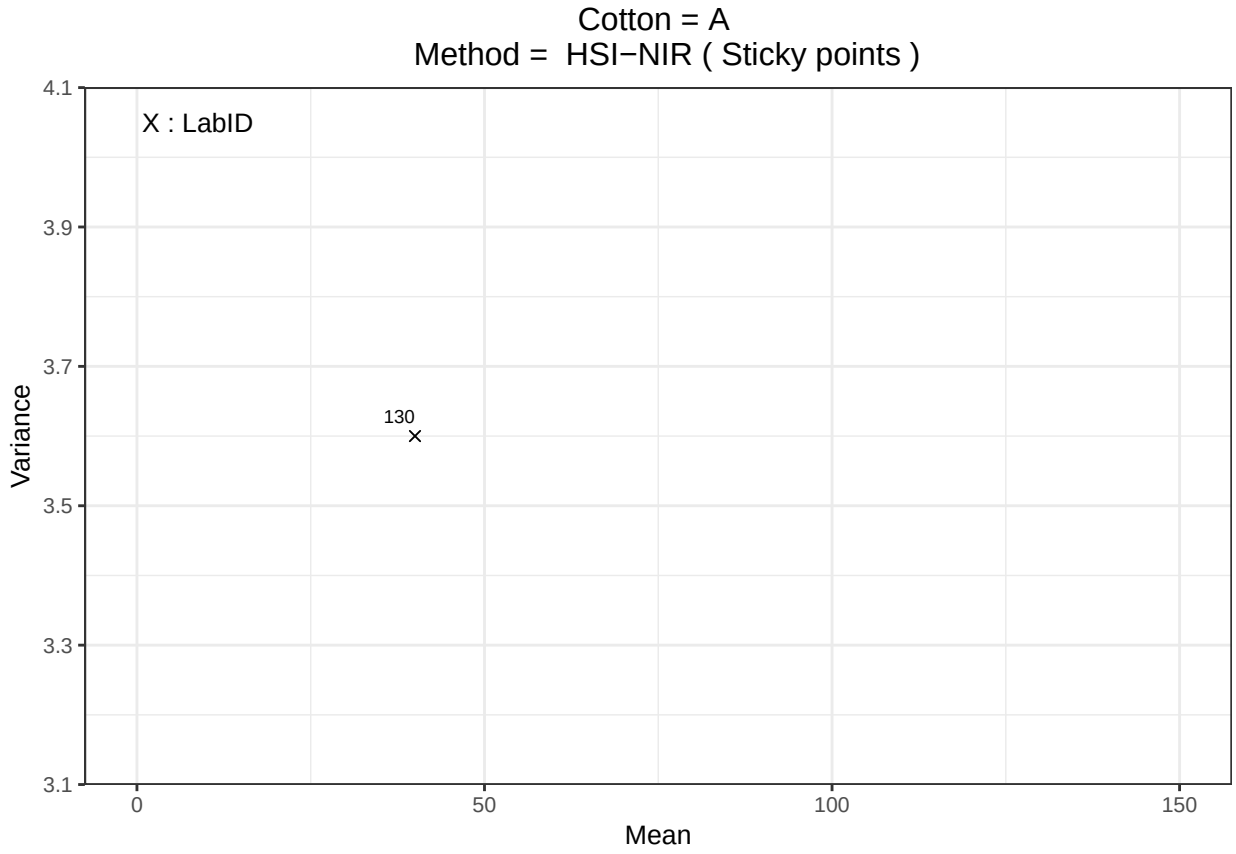


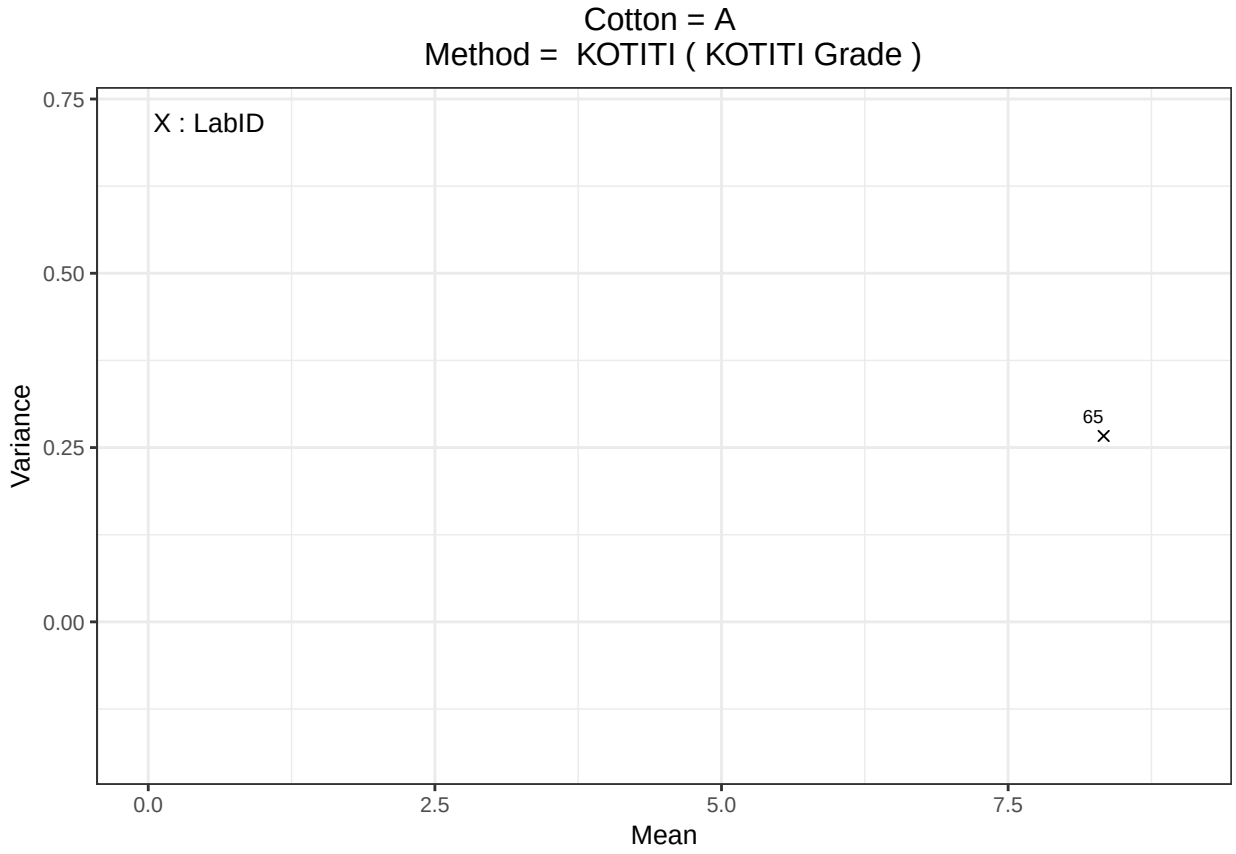
[1] "For Cotton = A and for method = Caramelization , 3 LabID (LabID being , 135, 140, 150) cannot be shown on this chart as only one measurement was performed and, therefore, a variance cannot be calculated in this case."

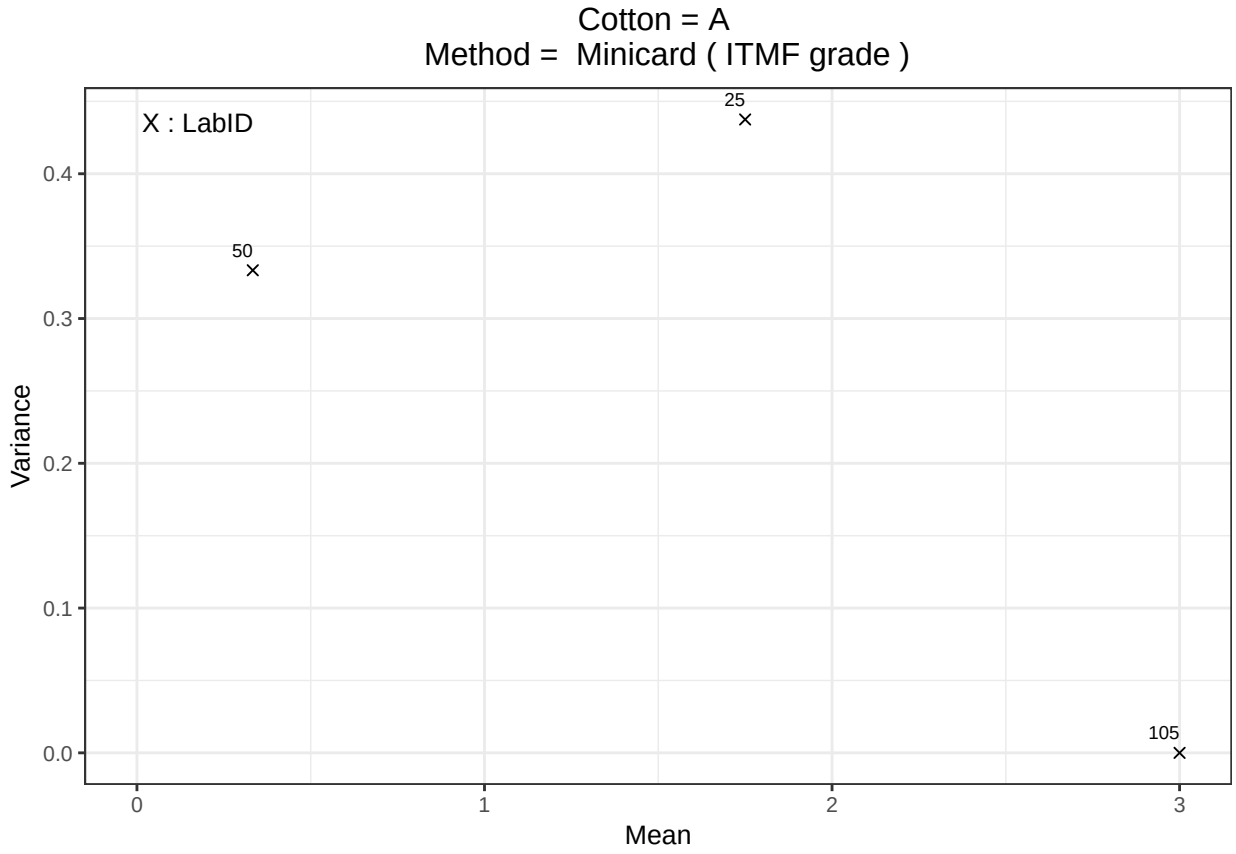

Cotton = A
Method = Clinitest (Color chart)
X : LabID
10
Variance
Mean
0.4
0.2
0.0
−0.2
−0.4
0
2
4
6

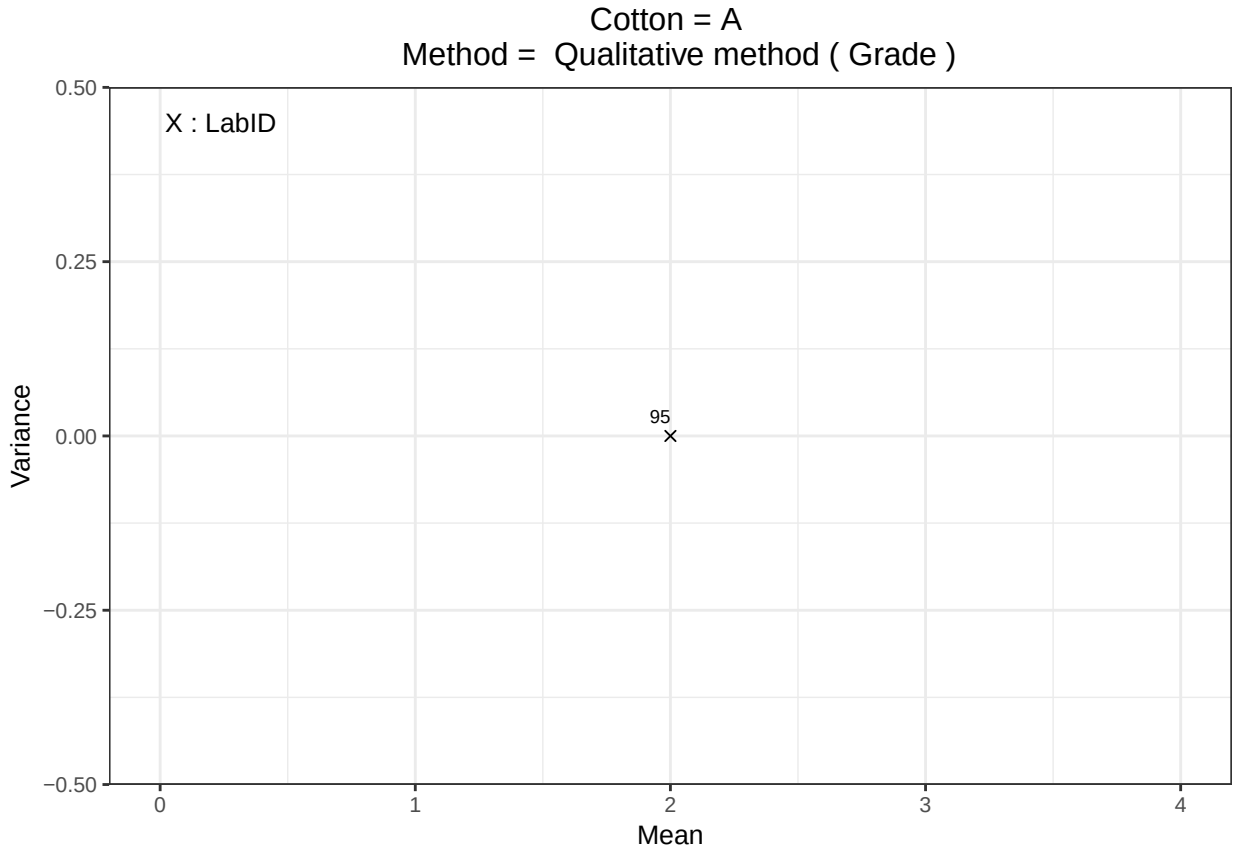

Cotton = A
Method = Contest−Fibermap (C/F Grade)
X : LabID
85
75
20
90
4000
3000
2000
1000
Variance
0
200
400
600
Mean

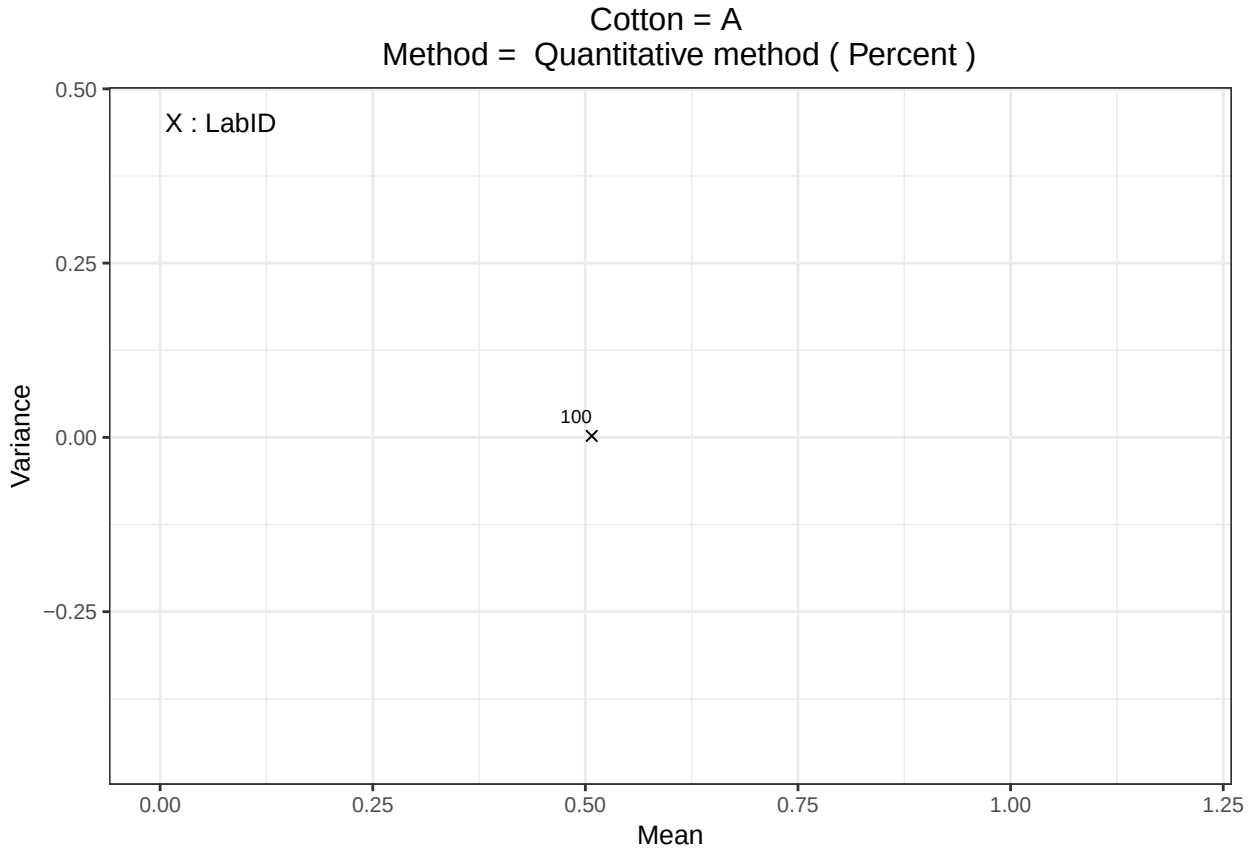

Cotton = A
Method = H2SD (Sticky points)
X : LabID
35
120
80
125
600
400
200
0
Variance
0
20
40
60
Mean

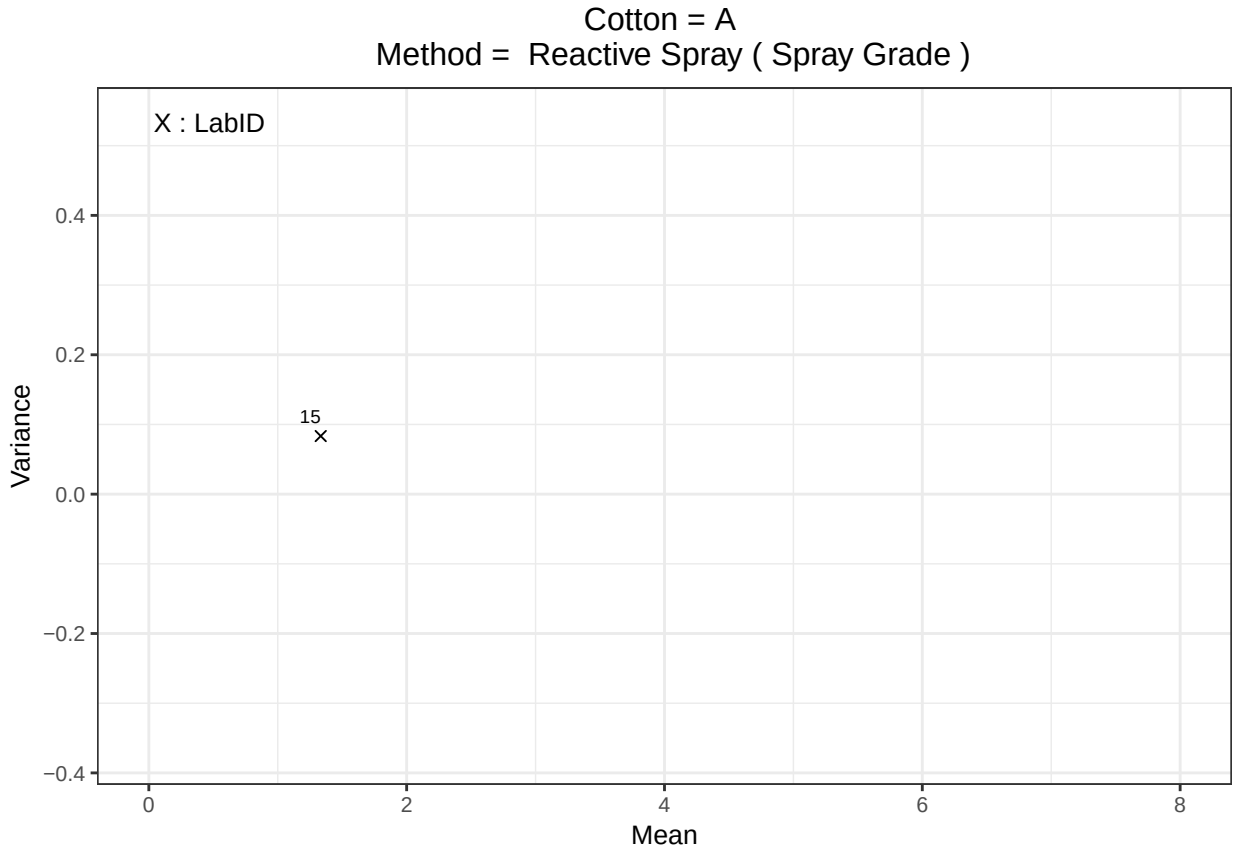

Cotton = A
Method = HSI−NIR (Sticky points)
X : LabID
130
Variance
Mean
4.1
3.9
3.7
3.5
3.3
3.1
0
50
100
150

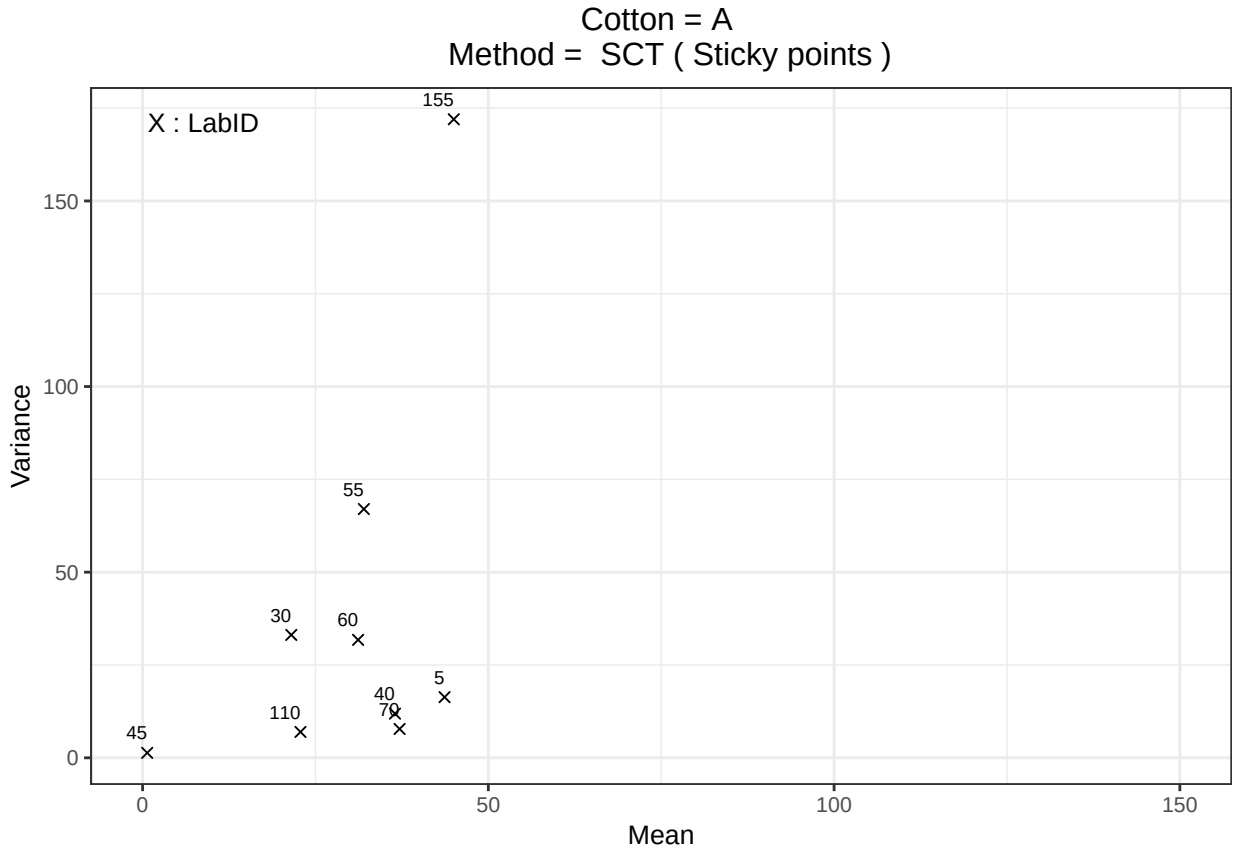

Cotton = A
Method = KOTITI (KOTITI Grade)
X : LabID
65
Variance
0.75
0.50
0.25
0.00
0.0
2.5
5.0
7.5
Mean


Cotton = A
Method = Minicard (ITMF grade)
X : LabID
25
50
105
Variance
Mean
0.0
0.1
0.2
0.3
0.4
0
1
2
3

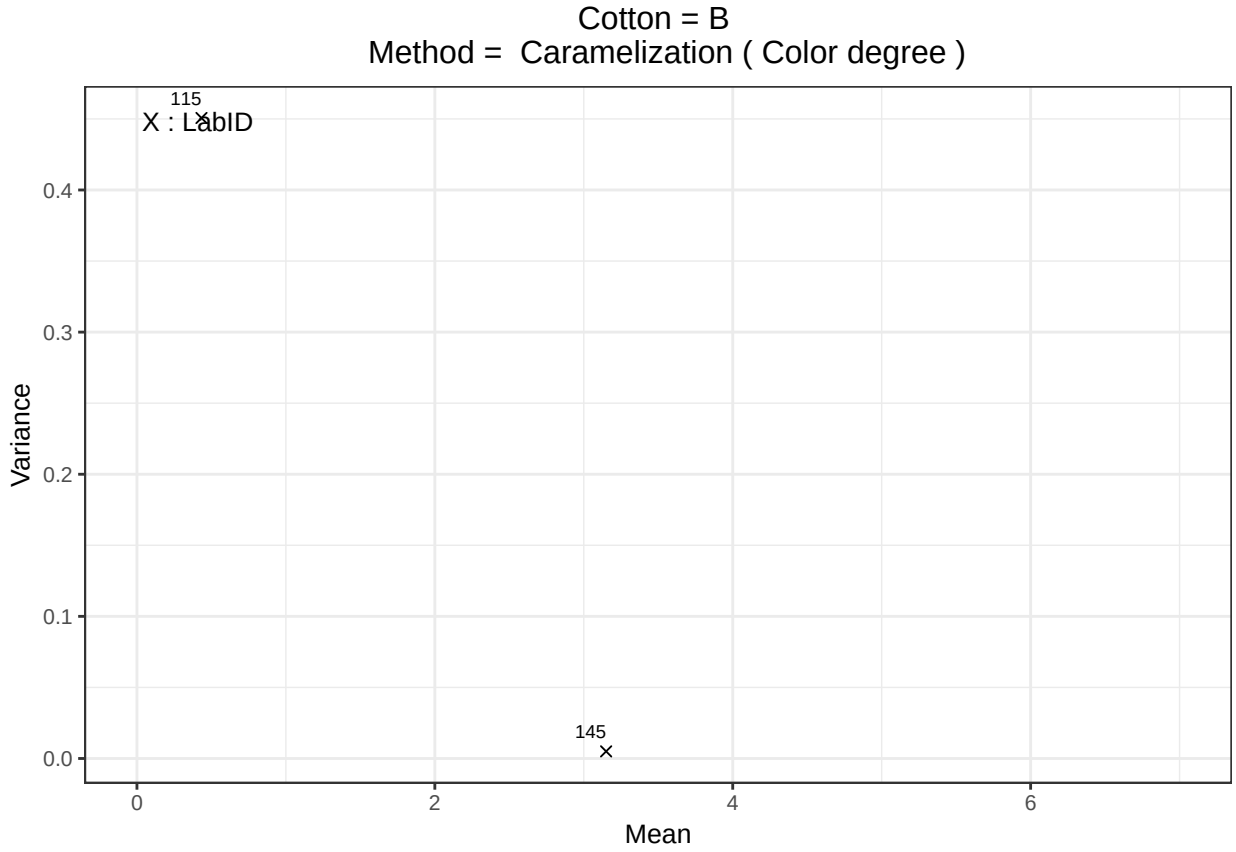

Cotton = A
Method = Qualitative method (Grade)
X : LabID
95
Variance
Mean
0.50
0.25
0.00
−0.25
−0.50
0
1
2
3
4


Cotton = A
Method = Quantitative method (Percent)
X : LabID
100
Variance
Mean
0.50
0.25
0.00
−0.25
0.00
0.25
0.50
0.75
1.00
1.25

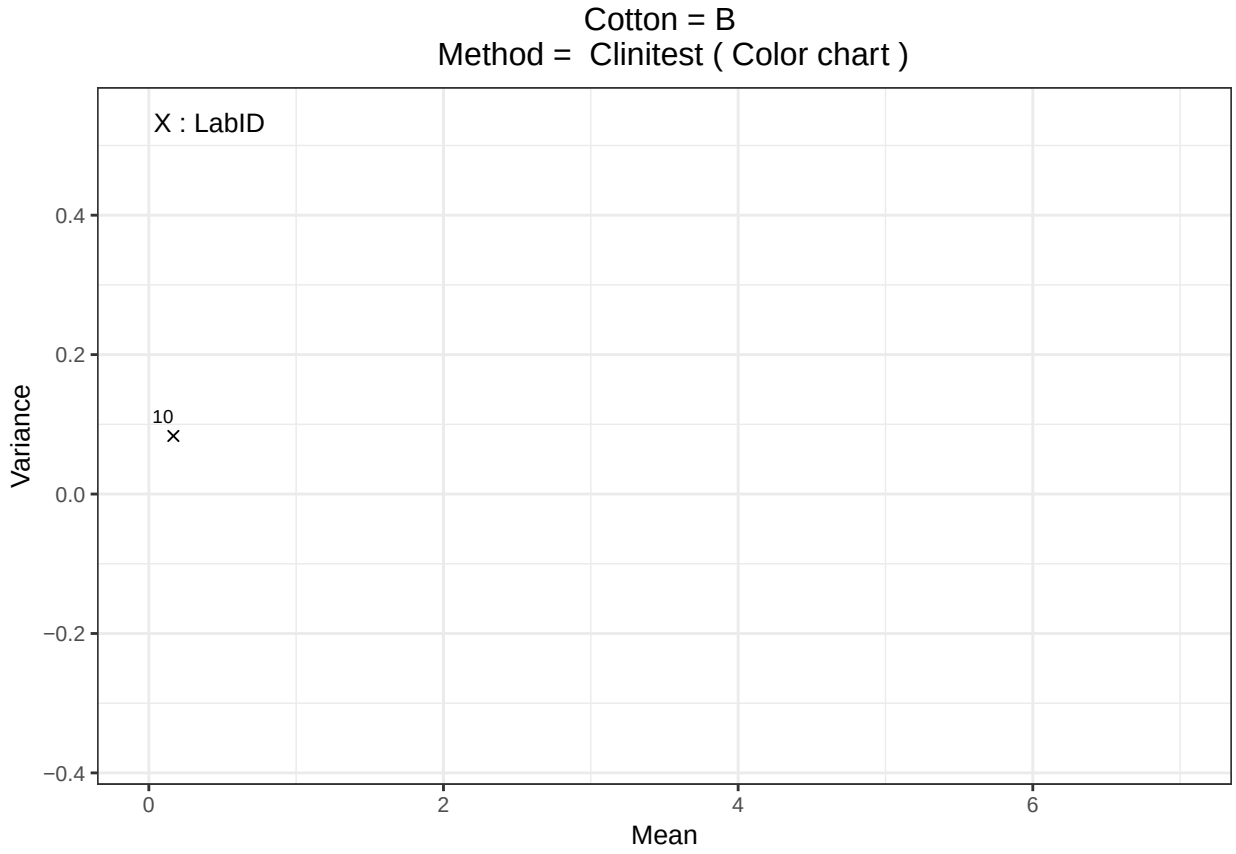

Cotton = A
Method = Reactive Spray (Spray Grade)
X : LabID
15
Variance
0.4
0.2
0.0
−0.2
−0.4
0
2
4
6
8
Mean

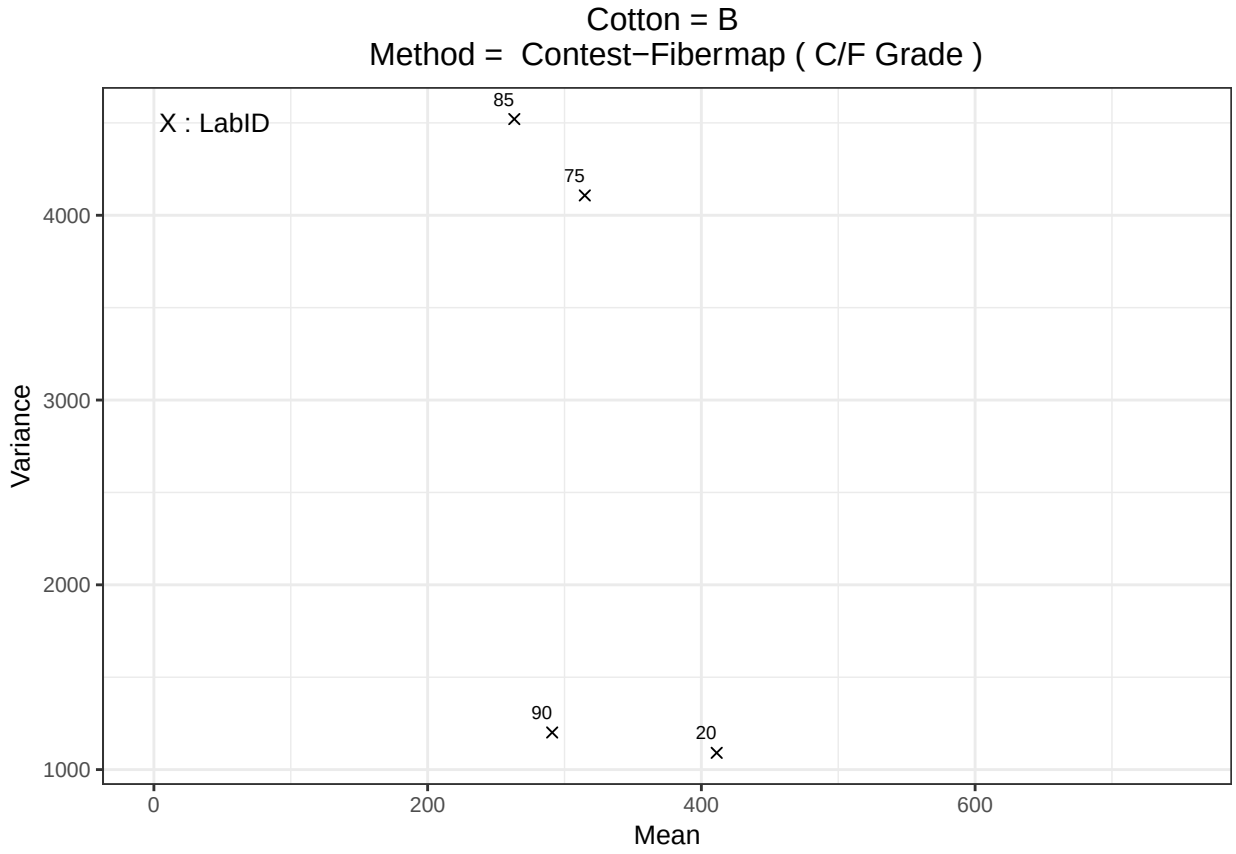

Cotton = A
Method = SCT (Sticky points)
X : LabID
155
55
30
60
5
40
70
110
45
Variance
Mean
0
50
100
150

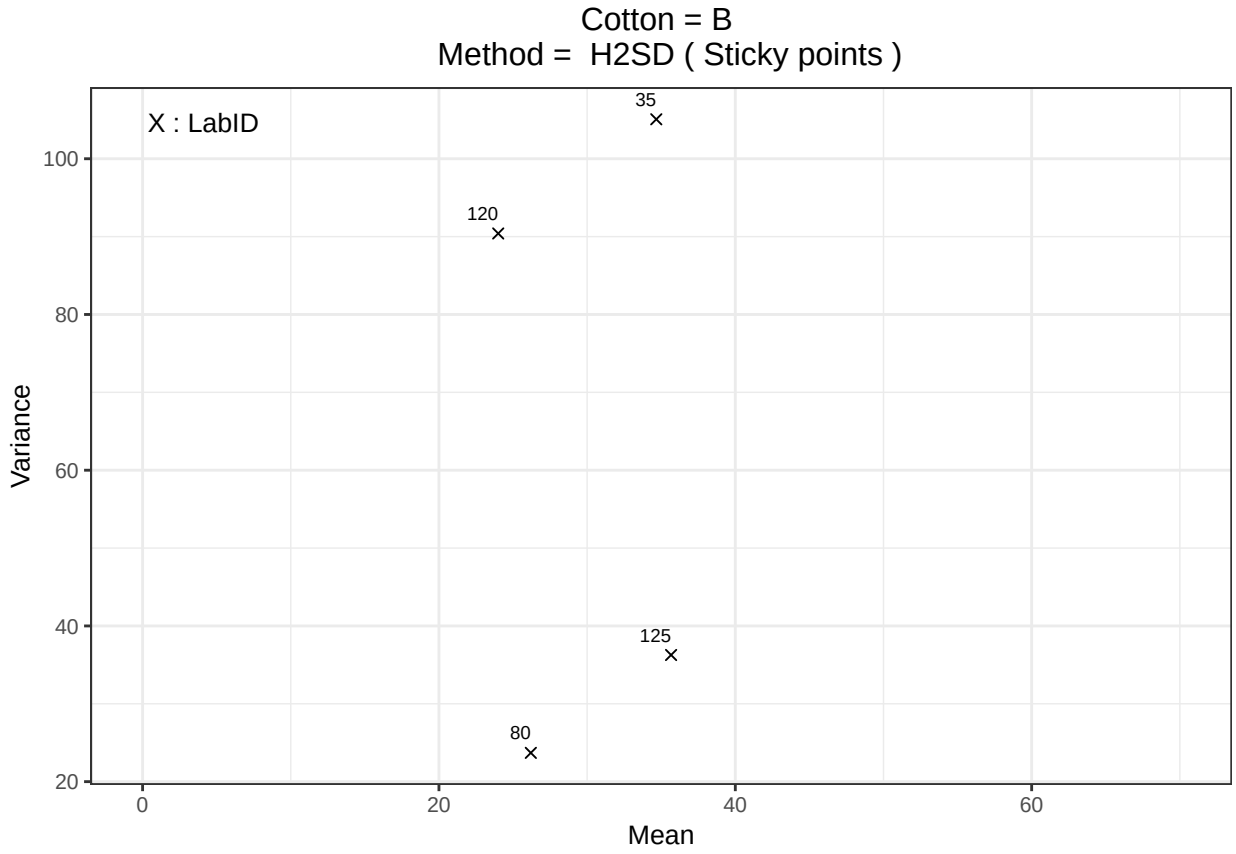
Cotton B : Variance between individual measurements = f(Mean) for all concerned labs

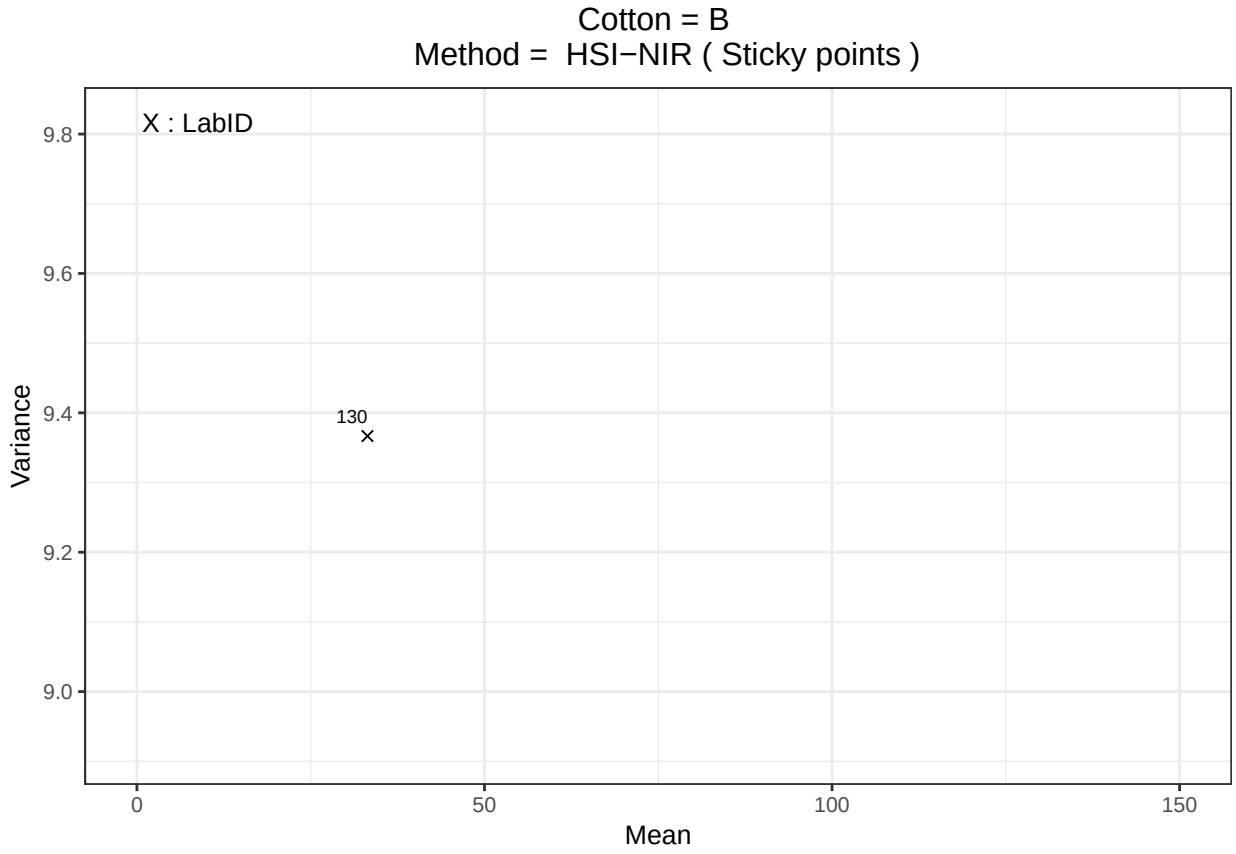


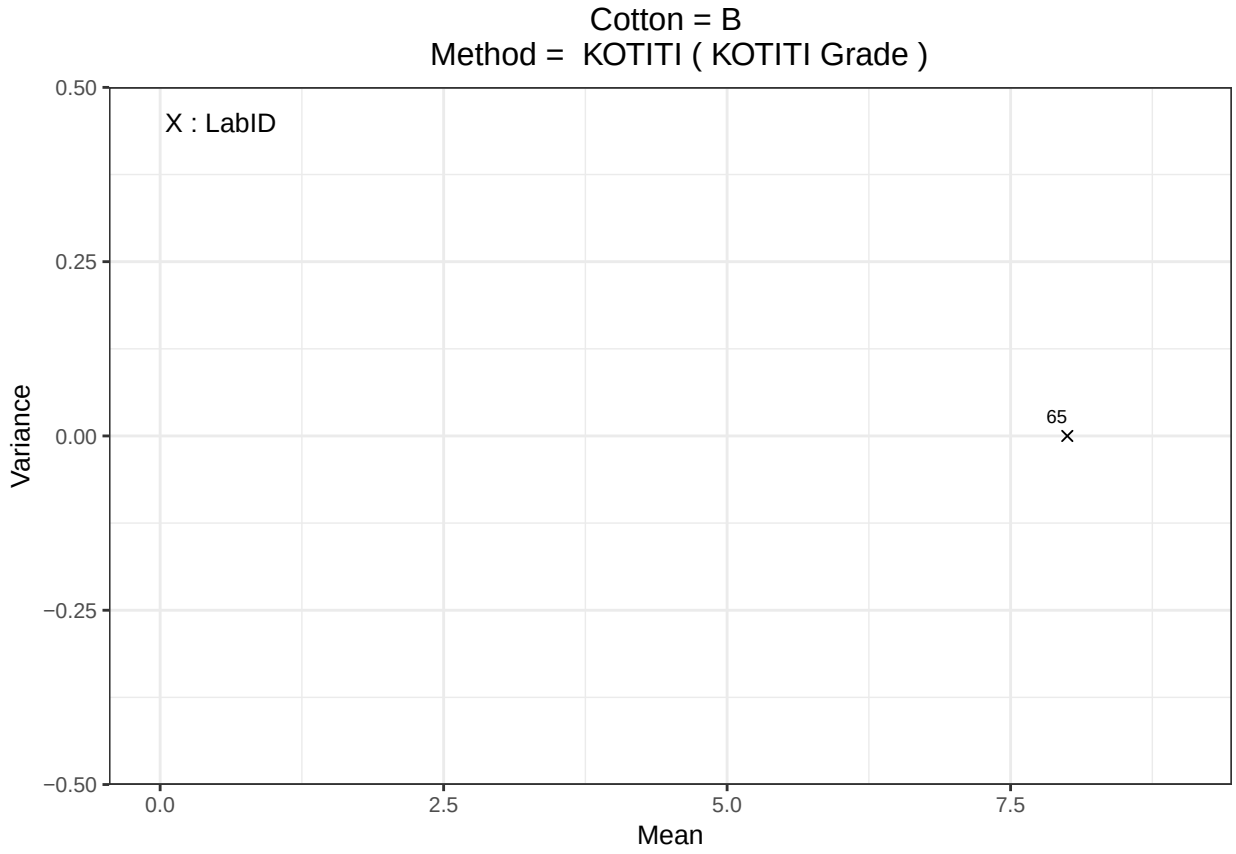
[1] "For Cotton = B and for method = Caramelization , 3 LabID (LabID being , 135, 140, 150) cannot be shown on this chart as only one measurement was performed and, therefore, a variance cannot be calculated in this case."

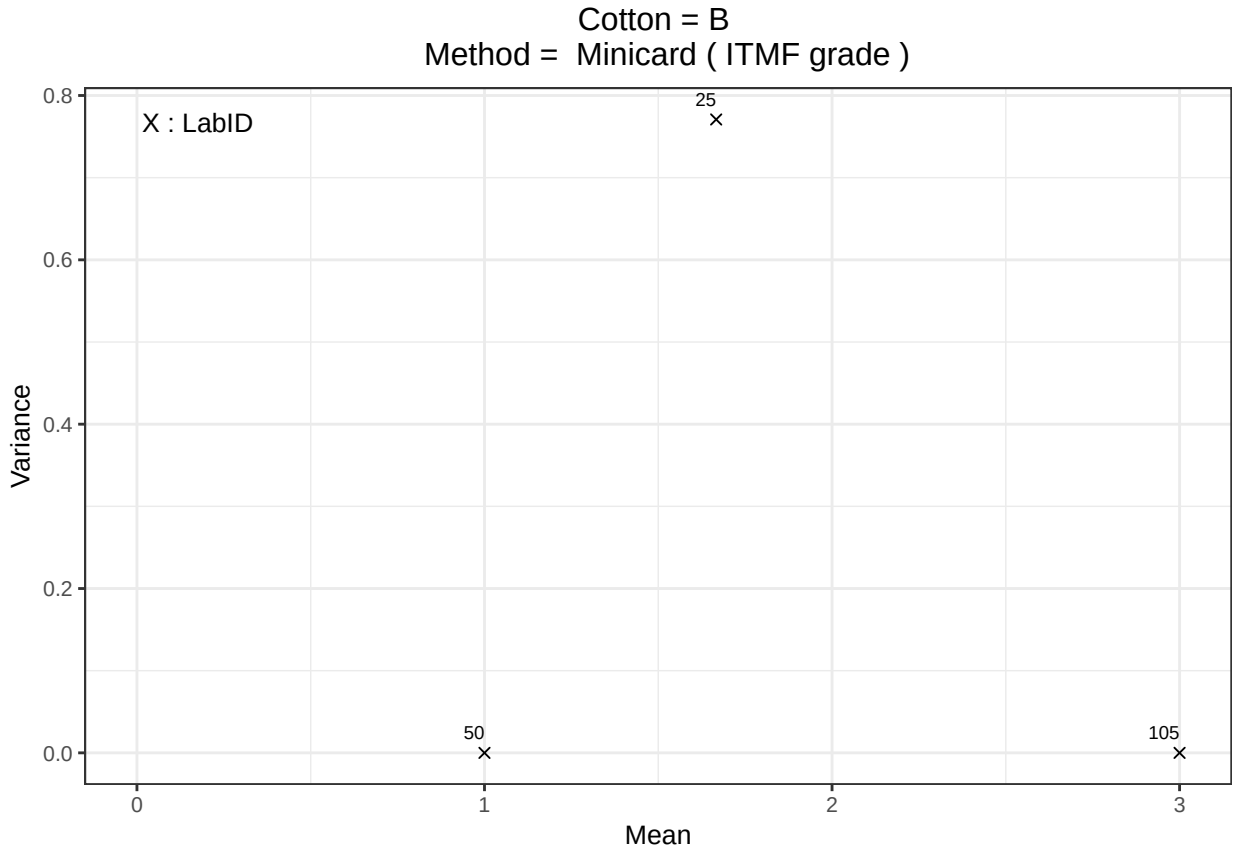

Cotton = B
Method = Clinitest (Color chart)
X : LabID
10
Variance
0.4
0.2
0.0
−0.2
−0.4
0
2
4
6
Mean

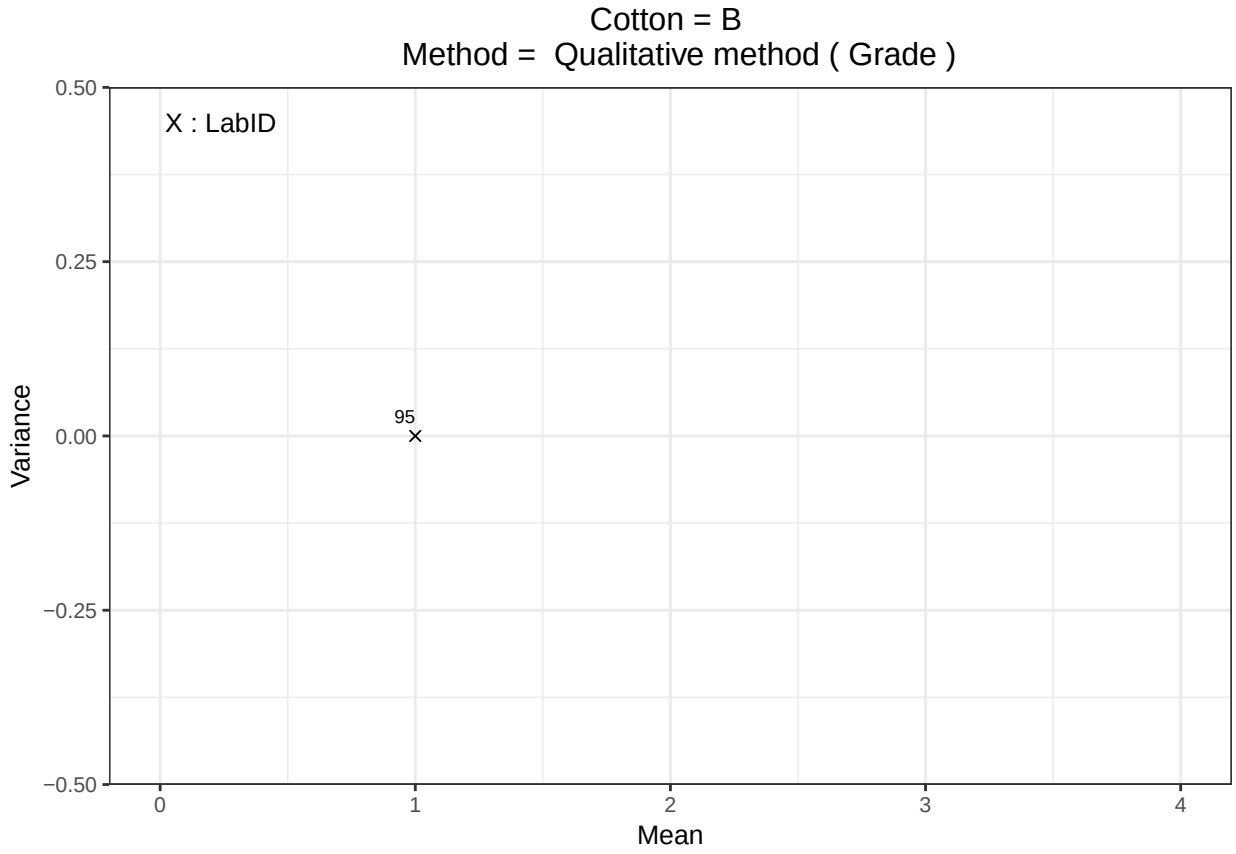

Cotton = B
Method = Contest−Fibermap (C/F Grade)
X : LabID
85
75
90
20
Variance
4000
3000
2000
1000
0
200
400
600
Mean

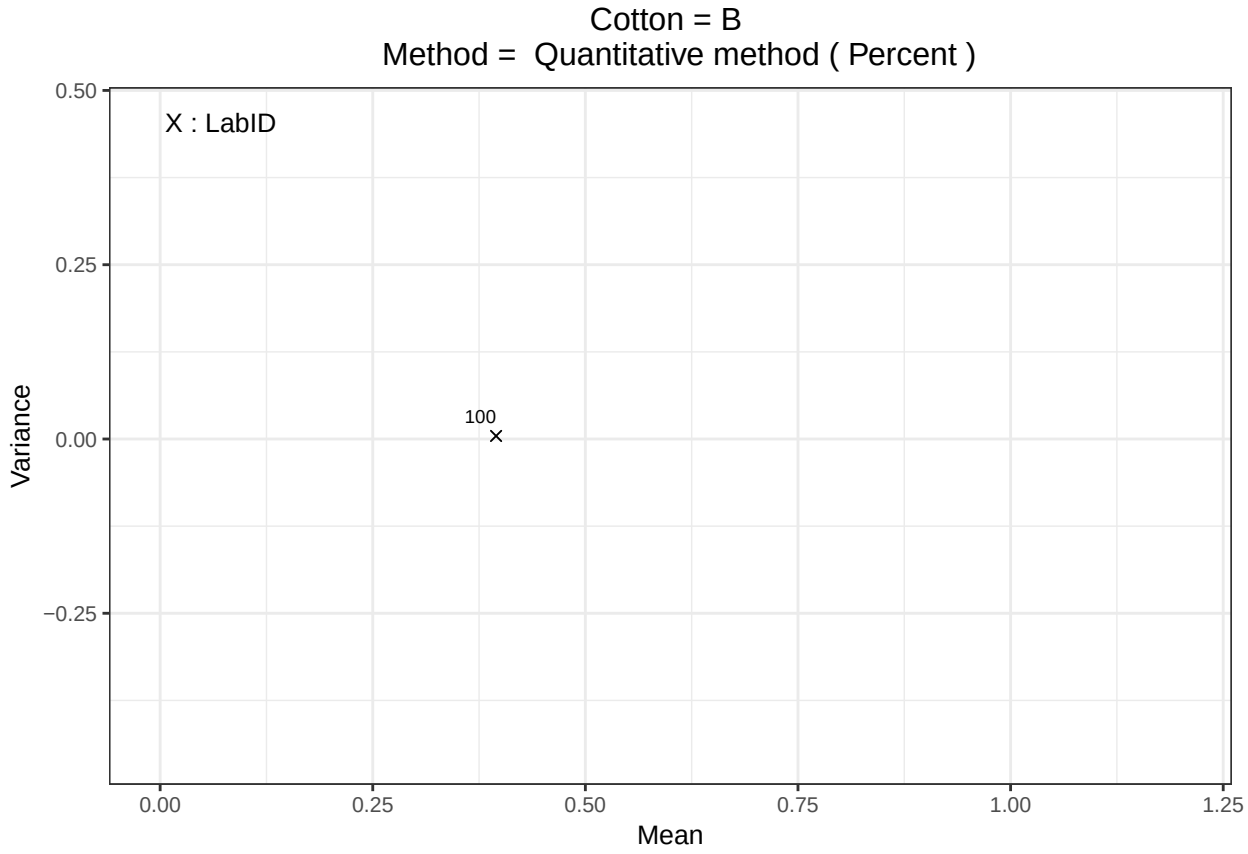

Cotton = B
Method = H2SD (Sticky points)
X : LabID
35
120
125
80
Variance
Mean
100
80
60
40
20
0
20
40
60

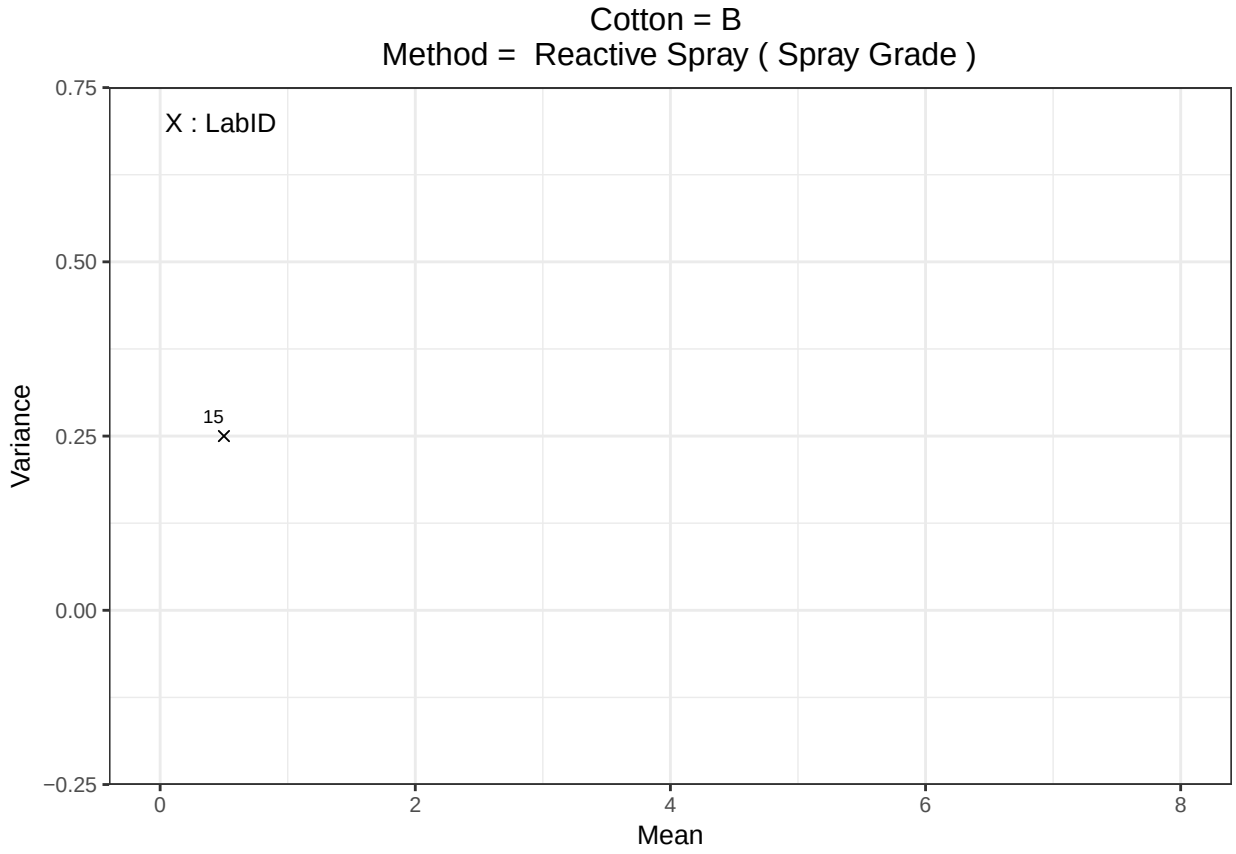

Cotton = B
Method = HSI−NIR (Sticky points)
X : LabID
130
Variance
Mean
9.8
9.6
9.4
9.2
9.0
0
50
100
150

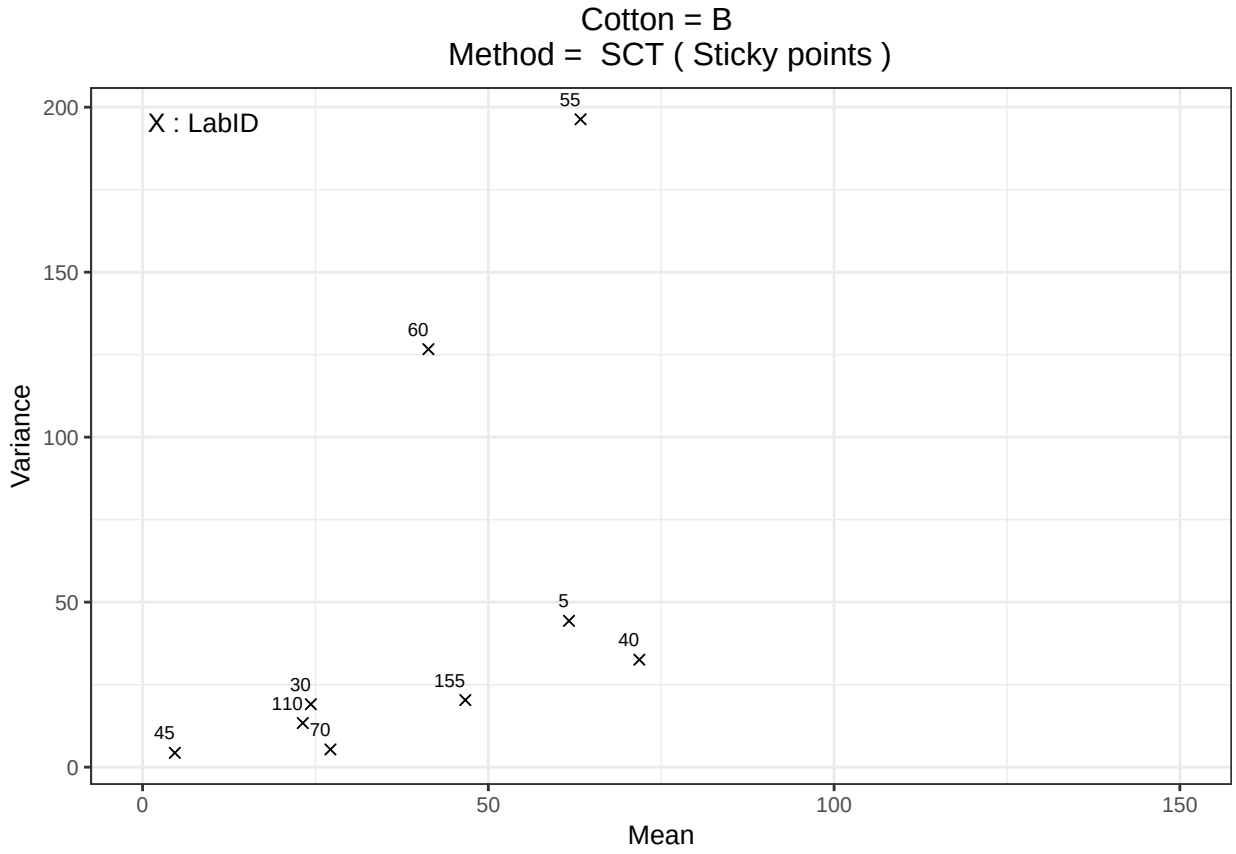

Cotton = B
Method = KOTITI (KOTITI Grade)
X : LabID
65
Variance
Mean
0.50
0.25
0.00
−0.25
−0.50
0.0
2.5
5.0
7.5


Cotton = B
Method = Minicard (ITMF grade)
X : LabID
25
50
105
Variance
Mean
0.0
0.2
0.4
0.6
0.8
0
1
2
3

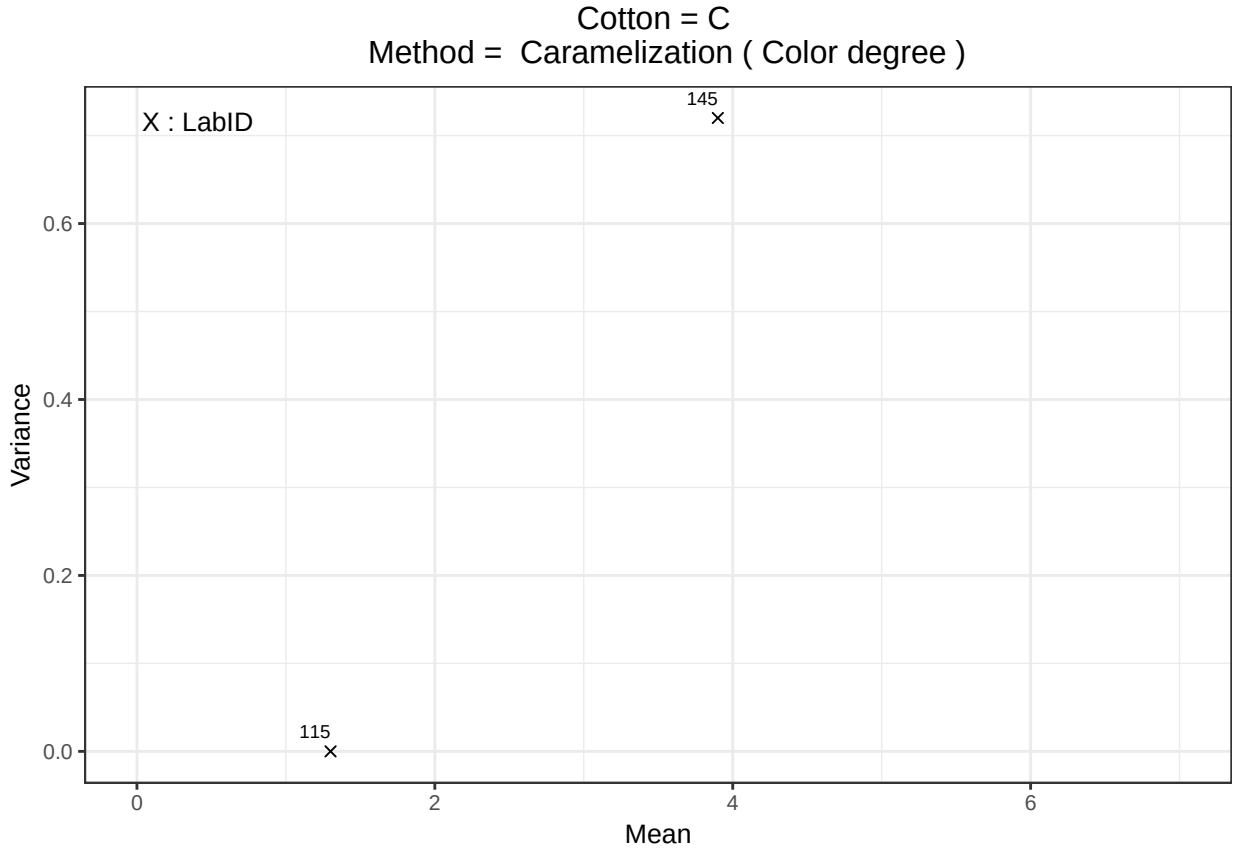

Cotton = B
Method = Qualitative method (Grade)
X : LabID
95
Variance
Mean
0.50
0.25
0.00
−0.25
−0.50
0
1
2
3
4


Cotton = B
Method = Quantitative method (Percent)
X : LabID
100
Variance
Mean
0.50
0.25
0.00
−0.25
0.00
0.25
0.50
0.75
1.00
1.25

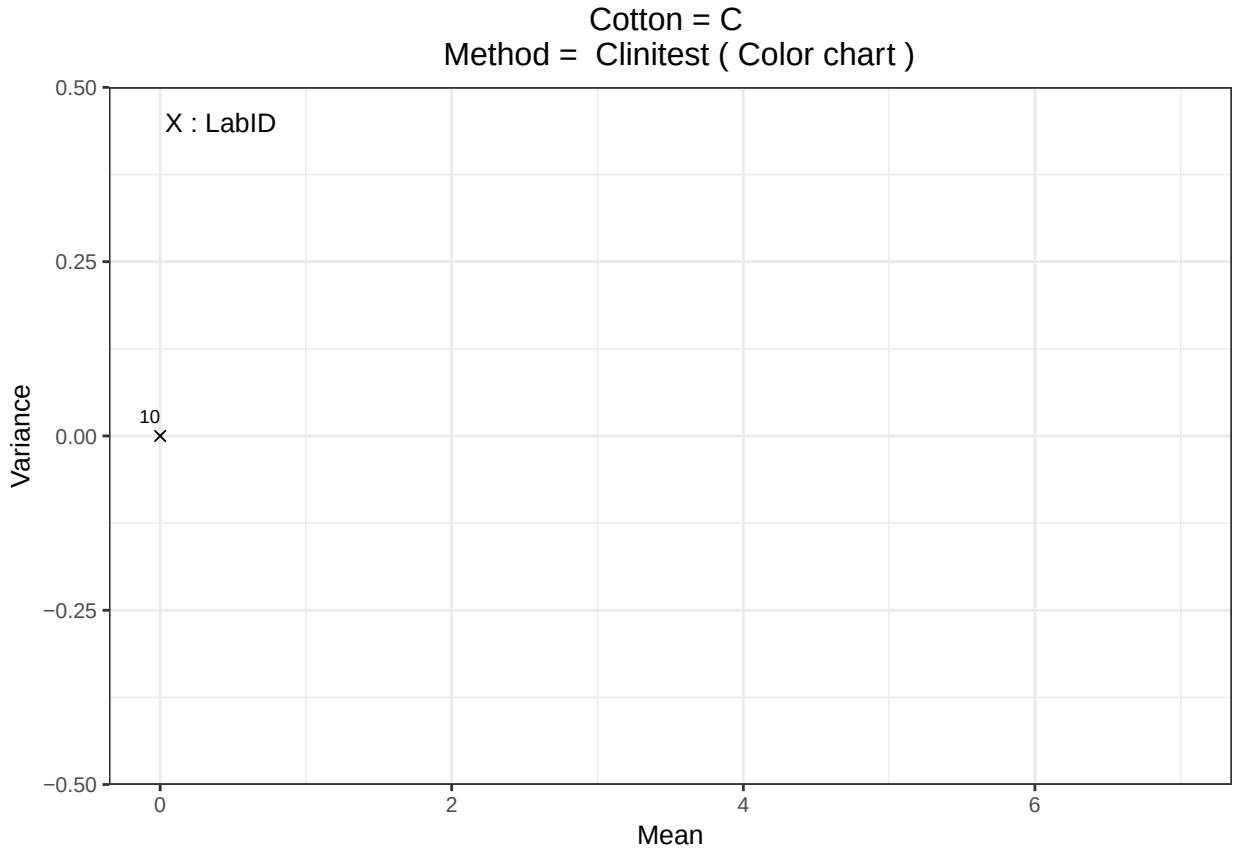

Cotton = B
Method = Reactive Spray (Spray Grade)
X : LabID
15
Variance
Mean
0.75
0.50
0.25
0.00
−0.25
0
2
4
6
8

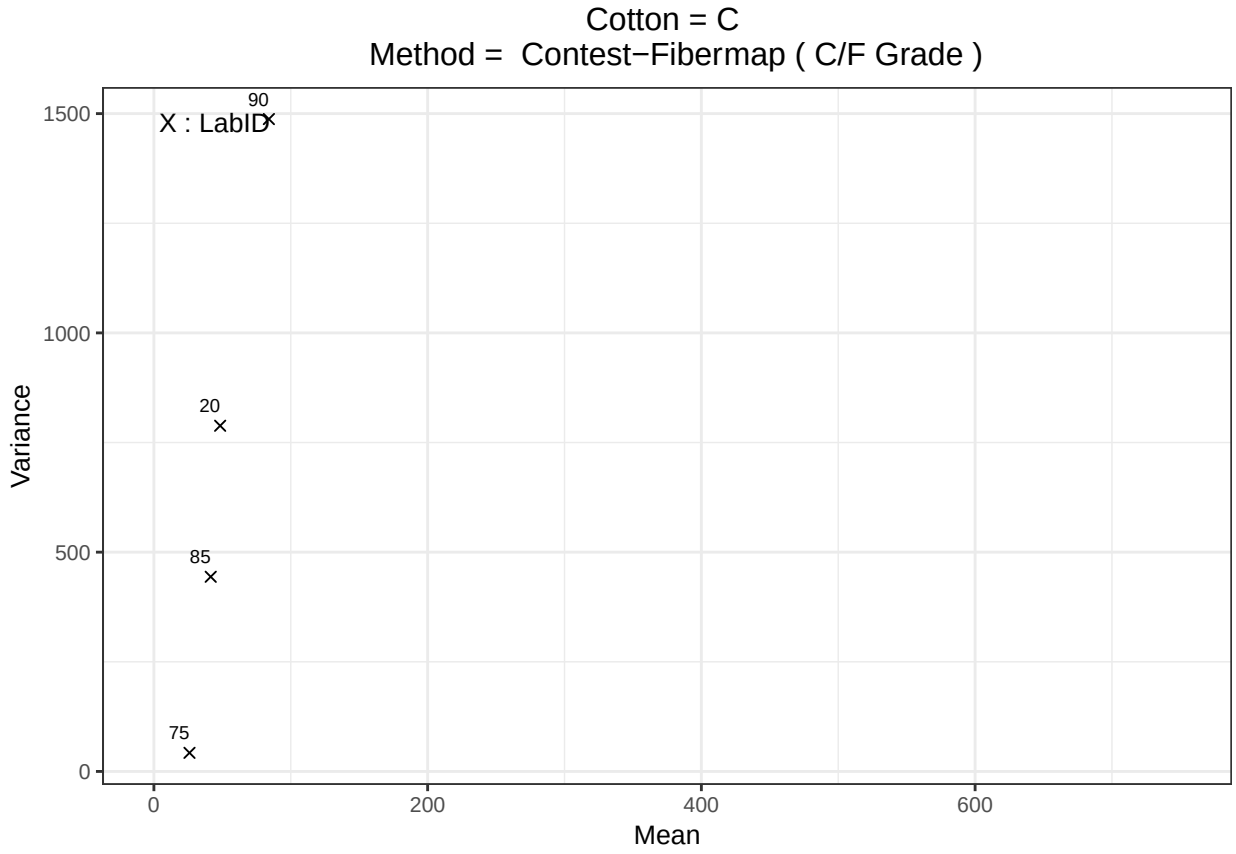

Cotton = B
Method = SCT (Sticky points)
X : LabID
55
60
5
40
155
30
110
70
45
Variance
Mean
200
150
100
50
0
0
50
100
150

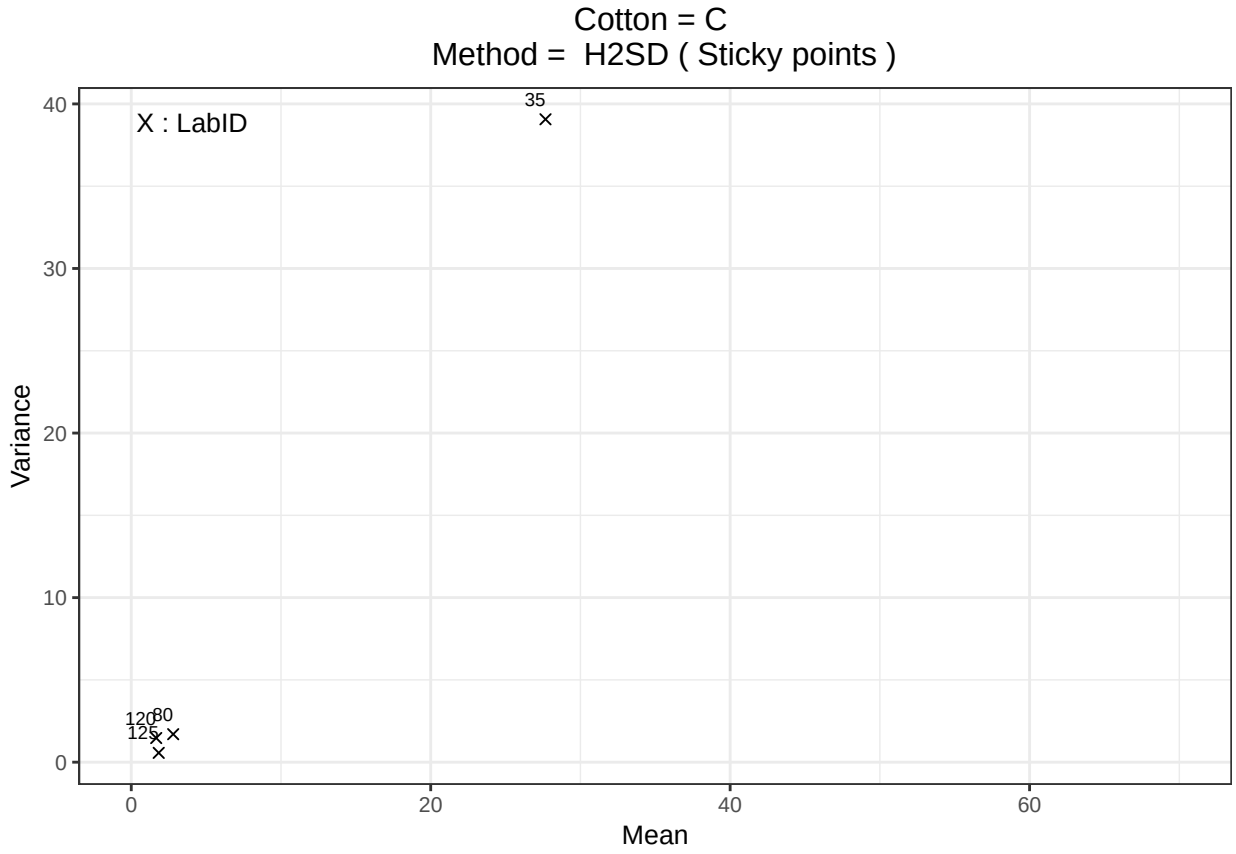
Cotton C : Variance between individual measurements = f(Mean) for all concerned labs

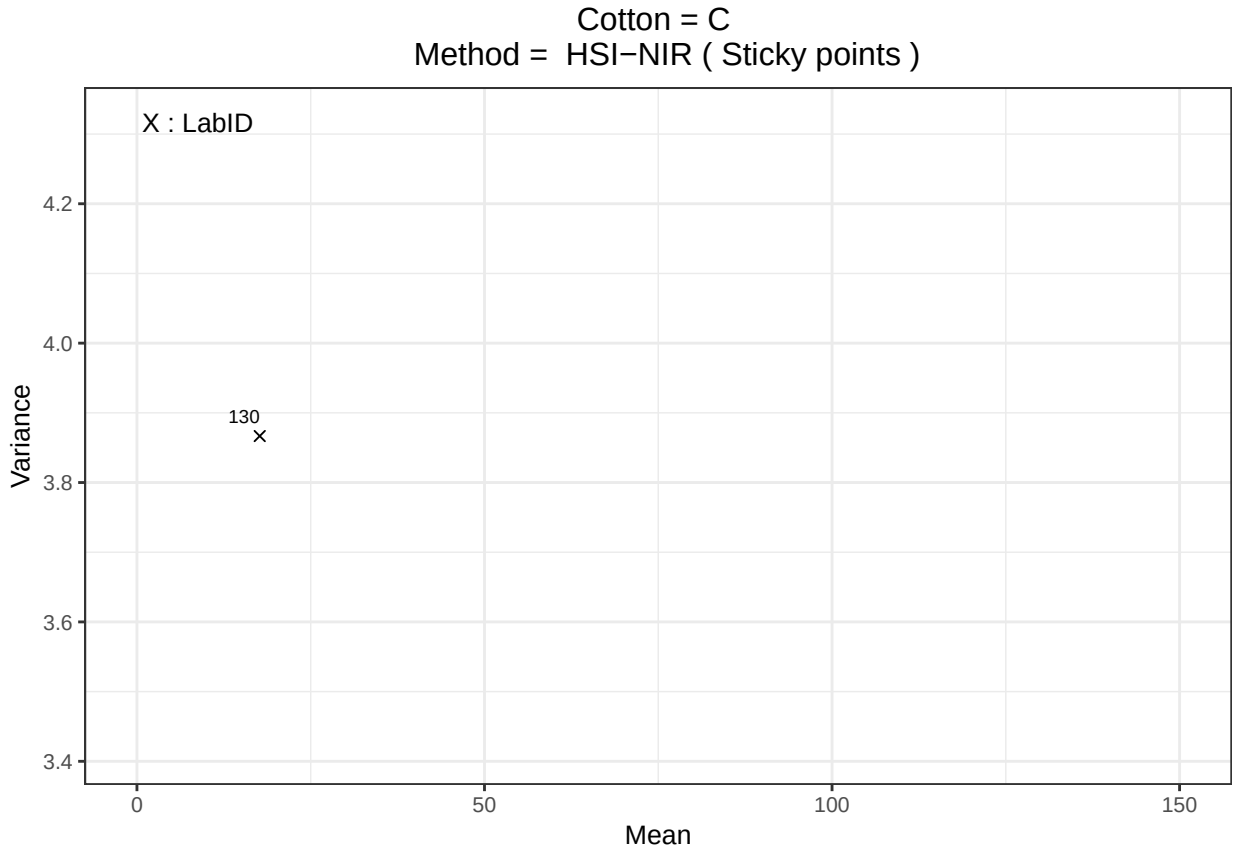


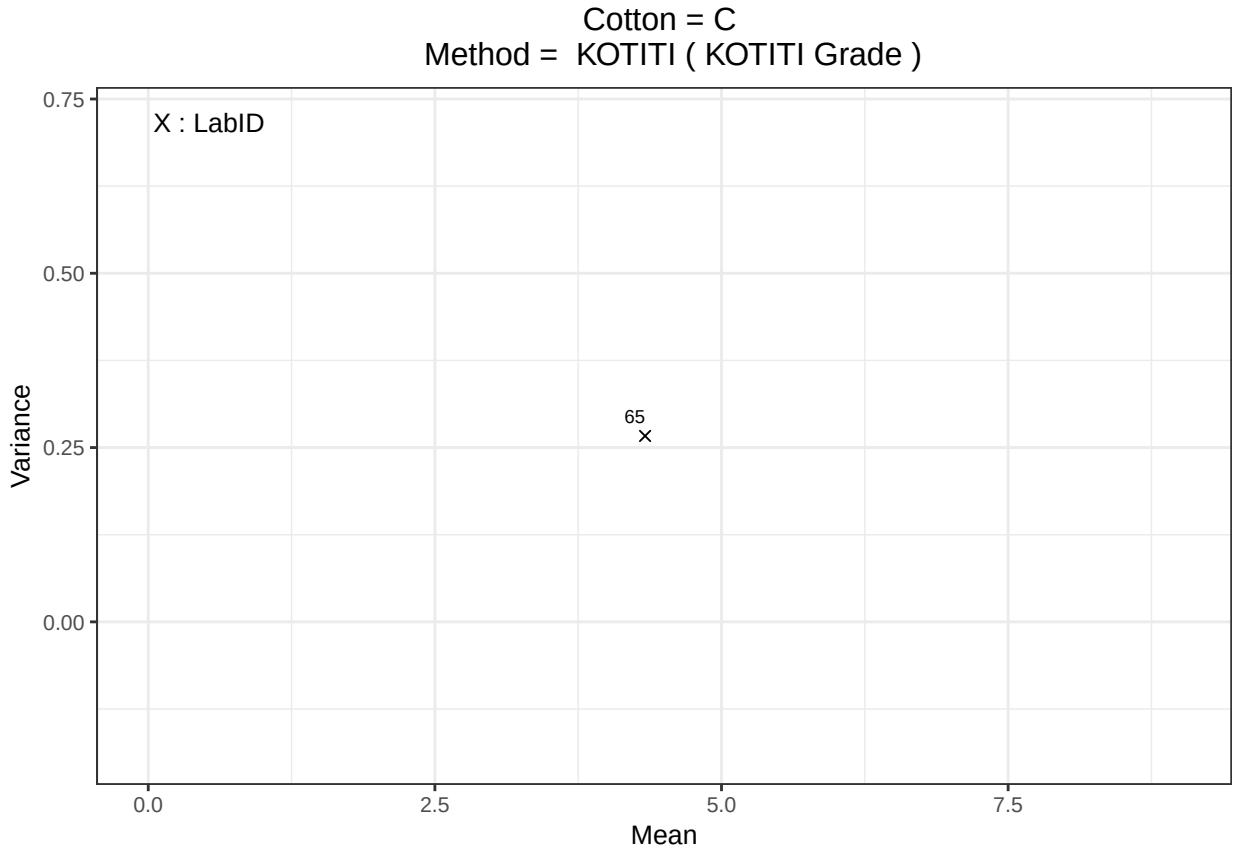
[1] "For Cotton = C and for method = Caramelization , 3 LabID (LabID being , 135, 140, 150) cannot be shown on this chart as only one measurement was performed and, therefore, a variance cannot be calculated in this case."

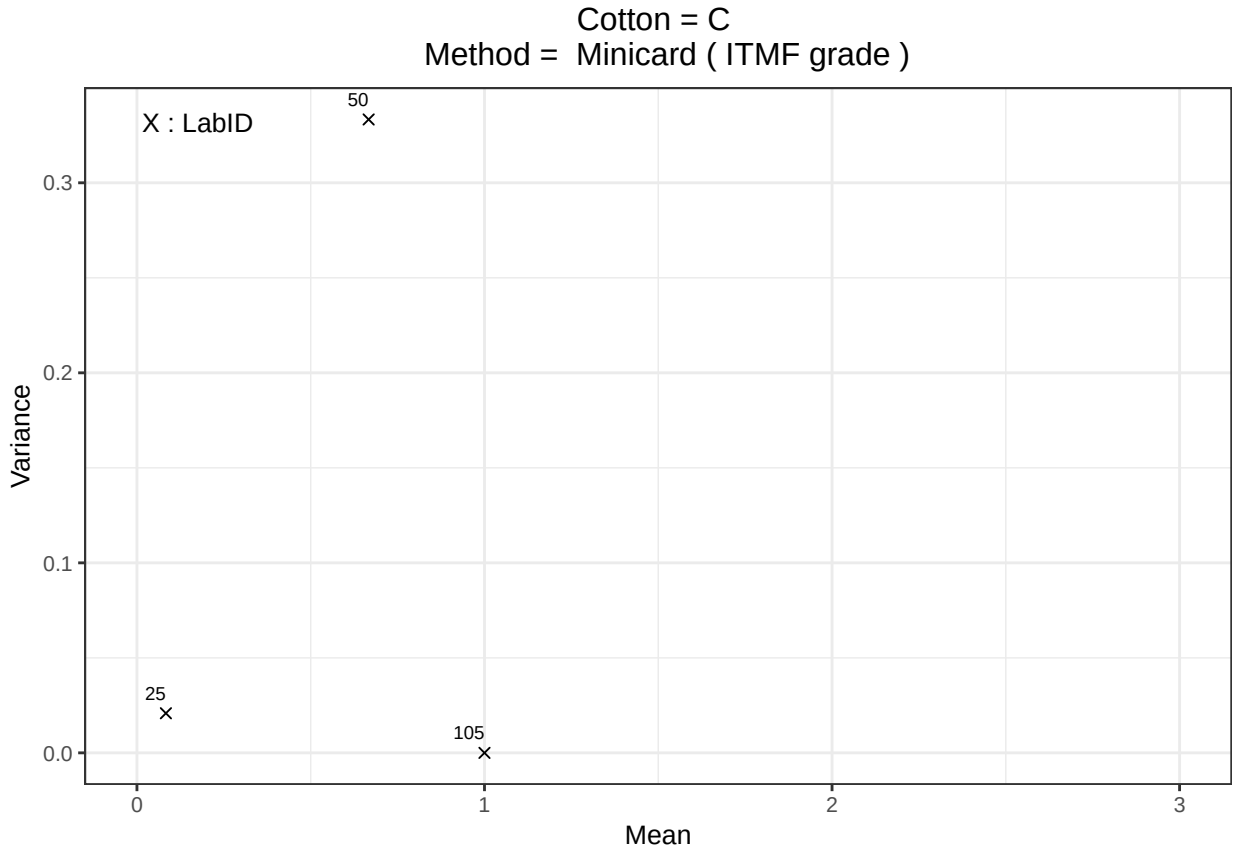

Cotton = C
Method = Clinitest (Color chart)
X : LabID
10
Variance
Mean
0.50
0.25
0.00
−0.25
−0.50
0
2
4
6

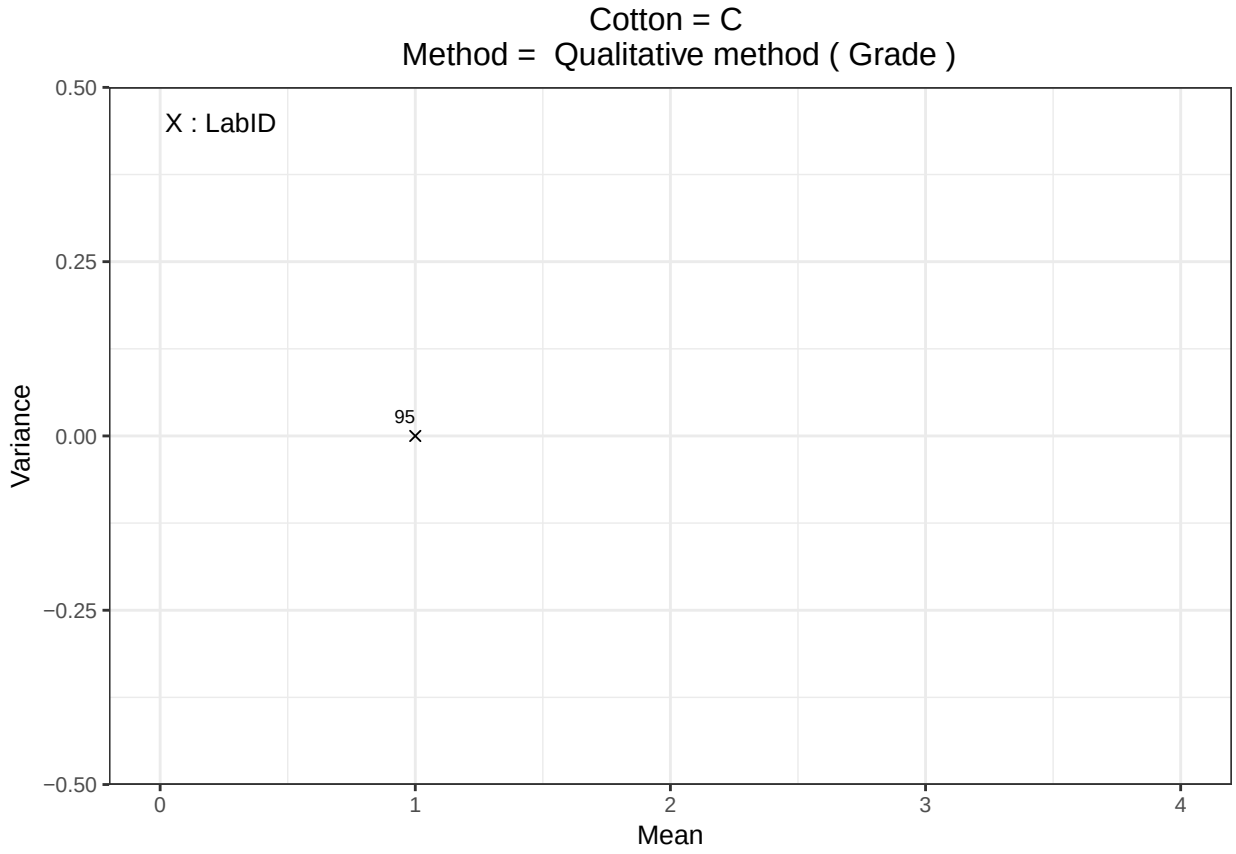

Cotton = C
Method = Contest−Fibermap (C/F Grade)
X : LabID
90
20
85
75
1500
1000
500
0
Variance
0
200
400
600
Mean

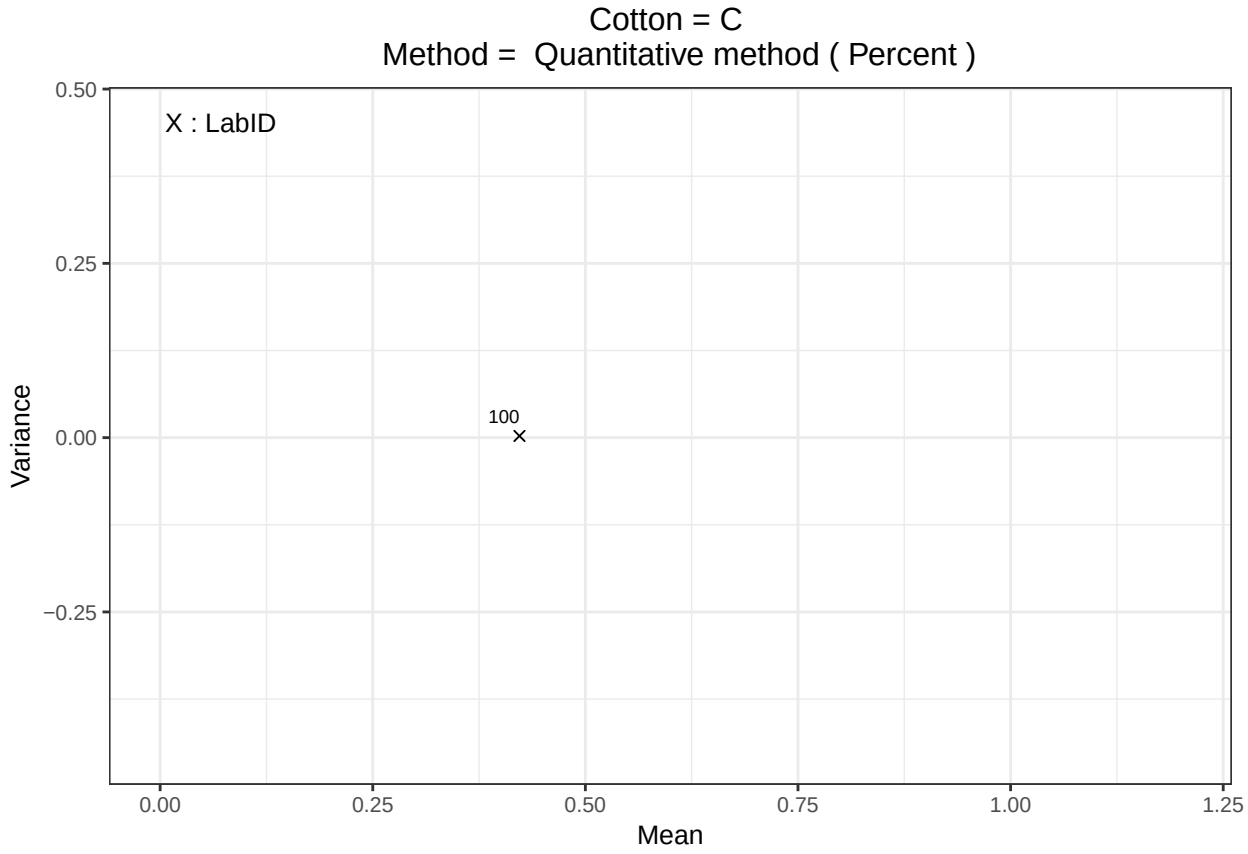

Cotton = C
Method = H2SD (Sticky points)
X : LabID
35
120
125
80
Variance
Mean
0
10
20
30
40
0
20
40
60

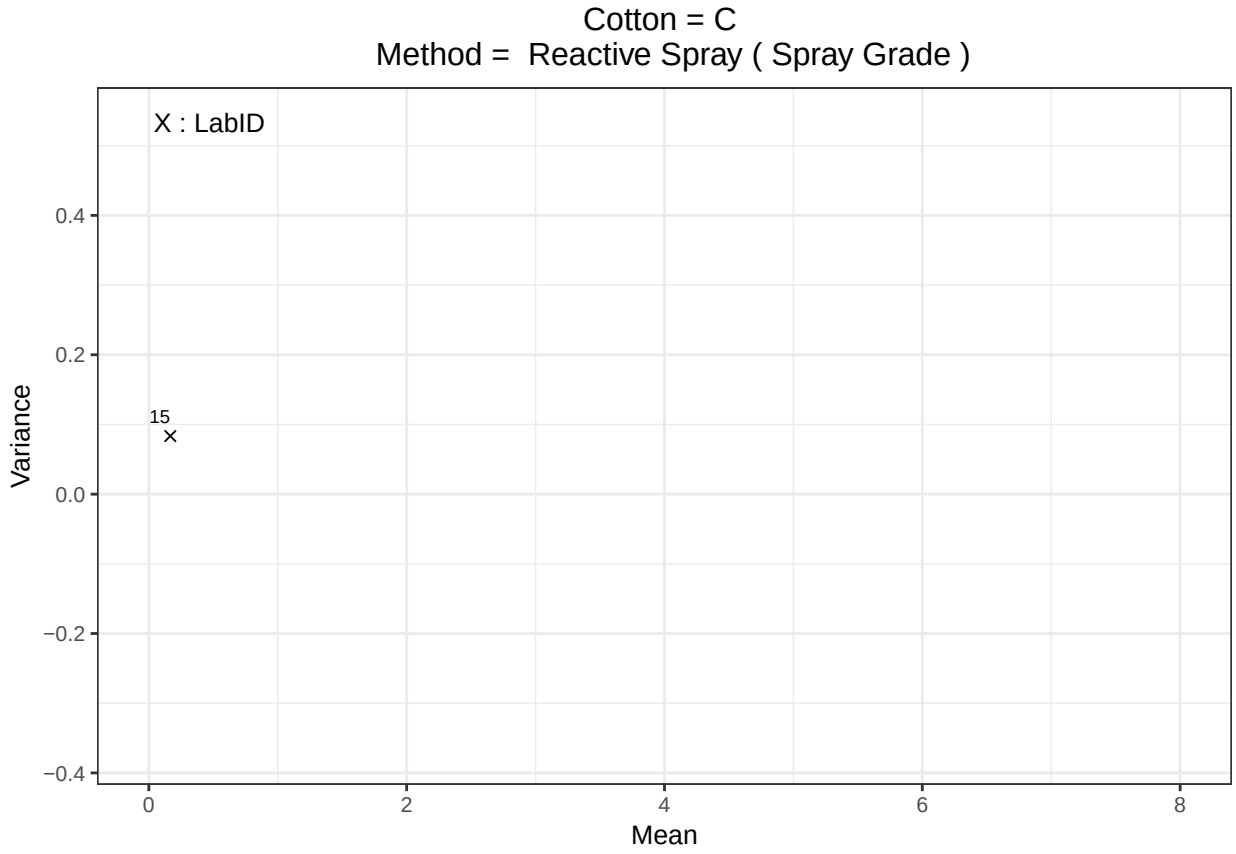

Cotton = C
Method = HSI−NIR (Sticky points)
X : LabID
130
Variance
4.2
4.0
3.8
3.6
3.4
0
50
100
150
Mean

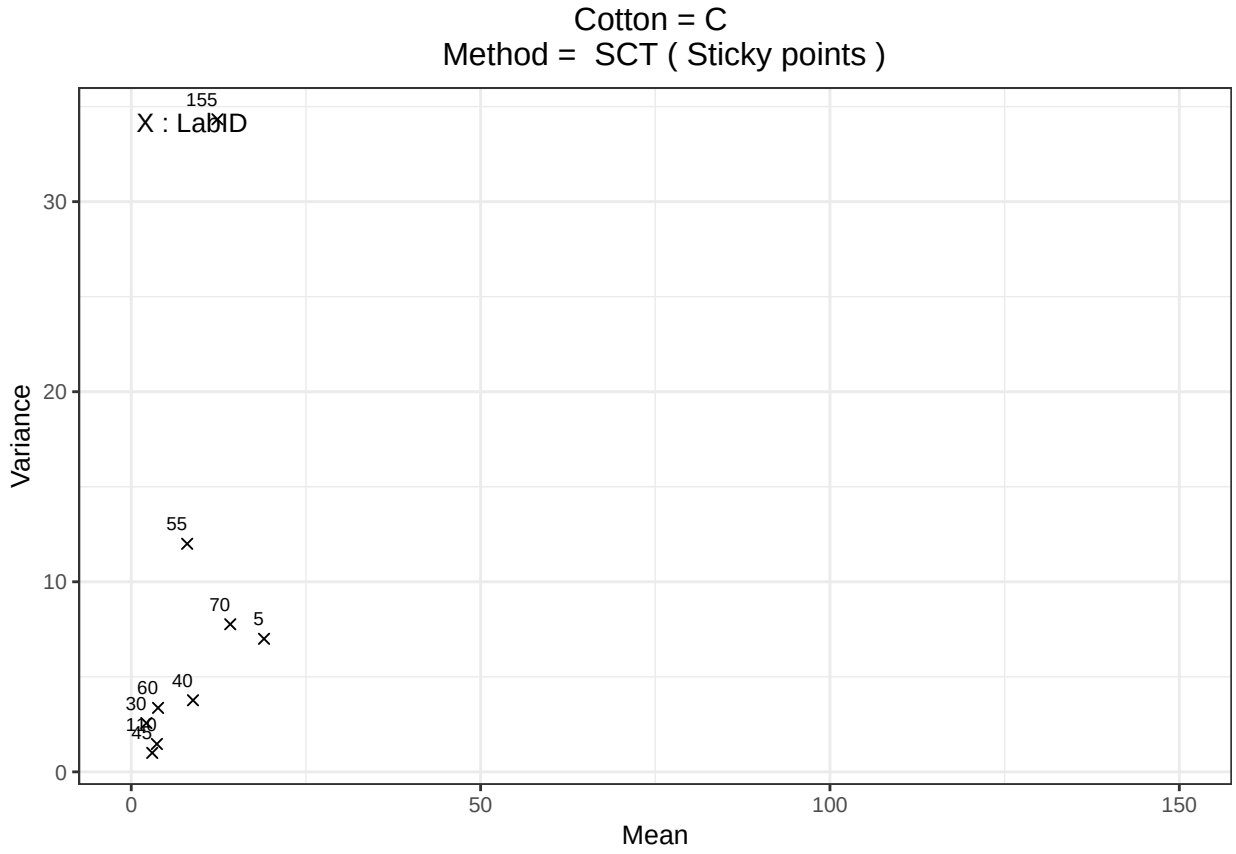

Cotton = C
Method = KOTITI (KOTITI Grade)
X : LabID
65
Variance
0.75
0.50
0.25
0.00
0.0
2.5
5.0
7.5
Mean


Cotton = C
Method = Minicard (ITMF grade)
X : LabID
50
25
105
Variance
Mean
0.0
0.1
0.2
0.3
0
1
2
3

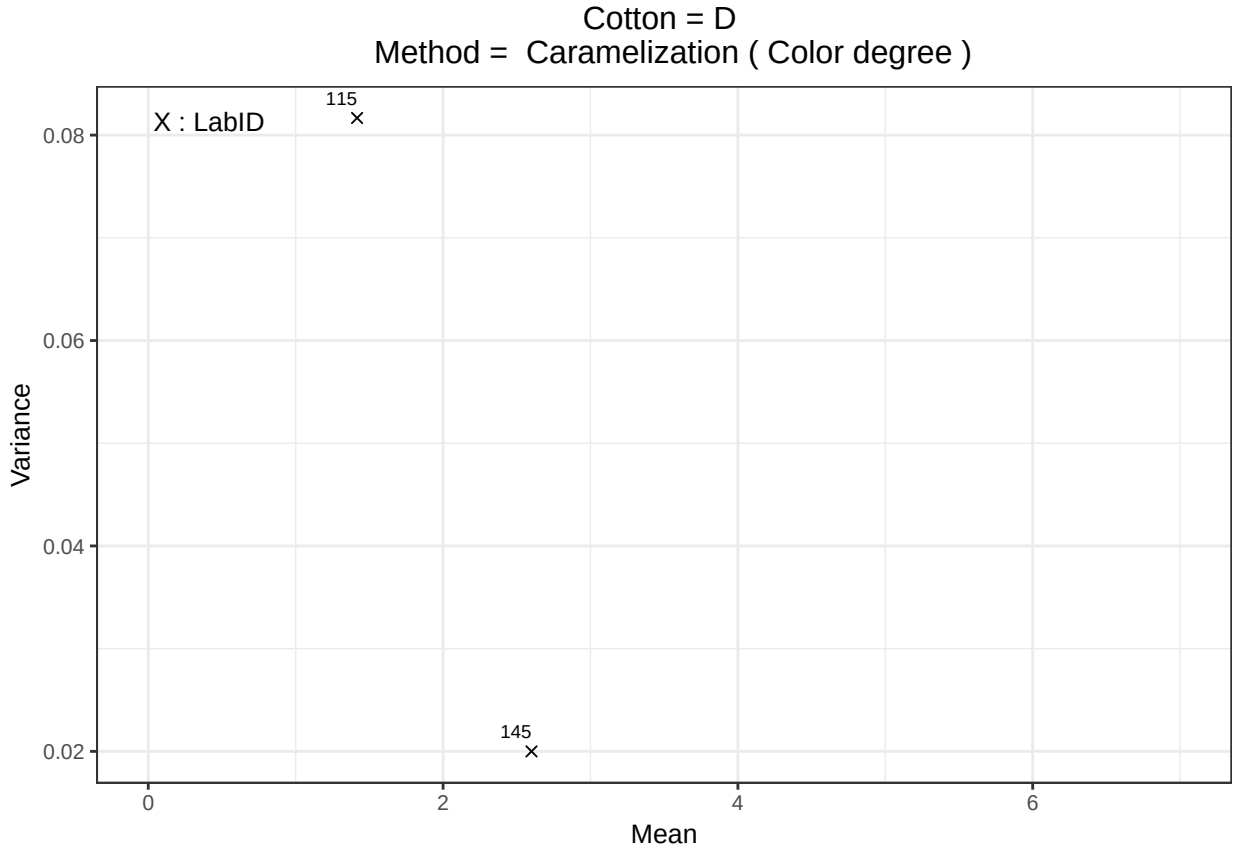

Cotton = C
Method = Qualitative method (Grade)
X : LabID
95
Variance
Mean
0.50
0.25
0.00
−0.25
−0.50
0
1
2
3
4


Cotton = C
Method = Quantitative method (Percent)
X : LabID
100
Variance
Mean
0.50
0.25
0.00
−0.25
0.00
0.25
0.50
0.75
1.00
1.25

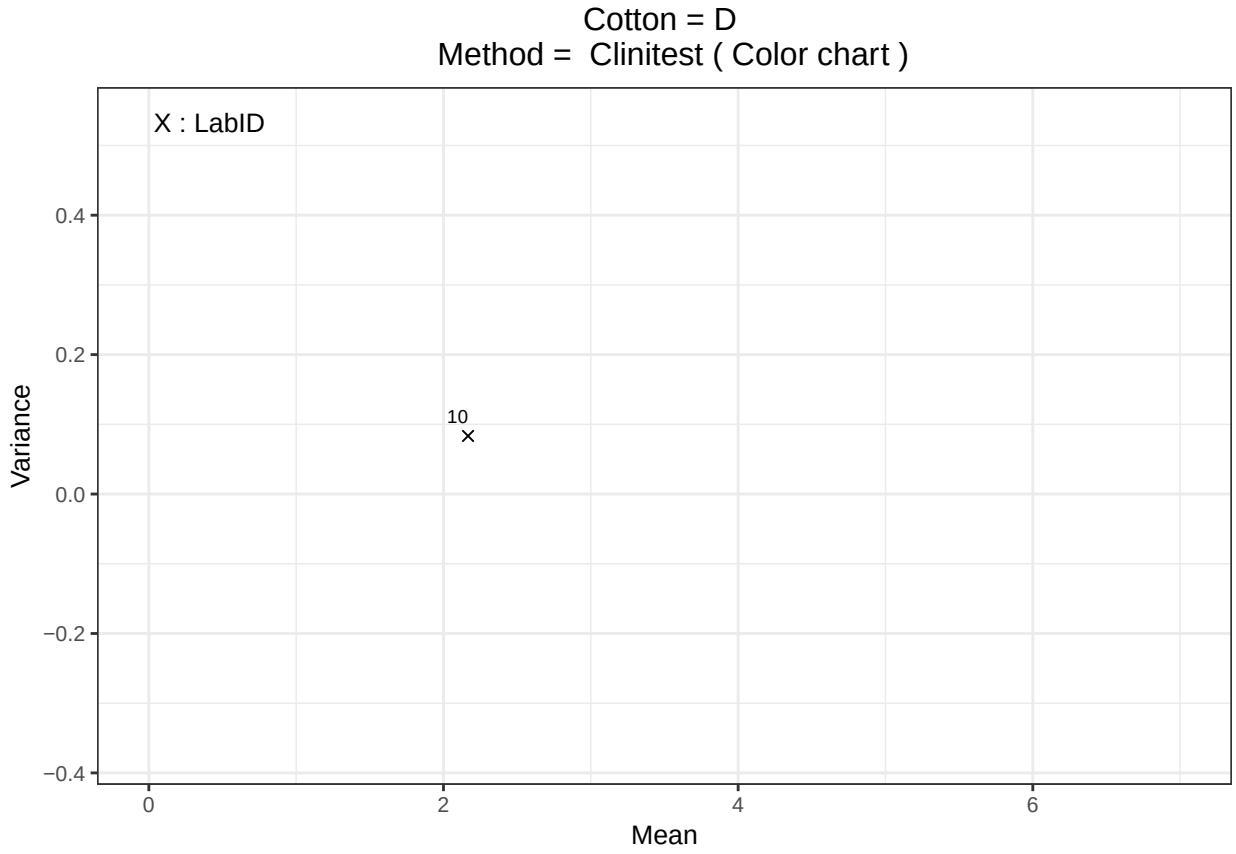

Cotton = C
Method = Reactive Spray (Spray Grade)
X : LabID
15
Variance
Mean
0.4
0.2
0.0
−0.2
−0.4
0
2
4
6
8

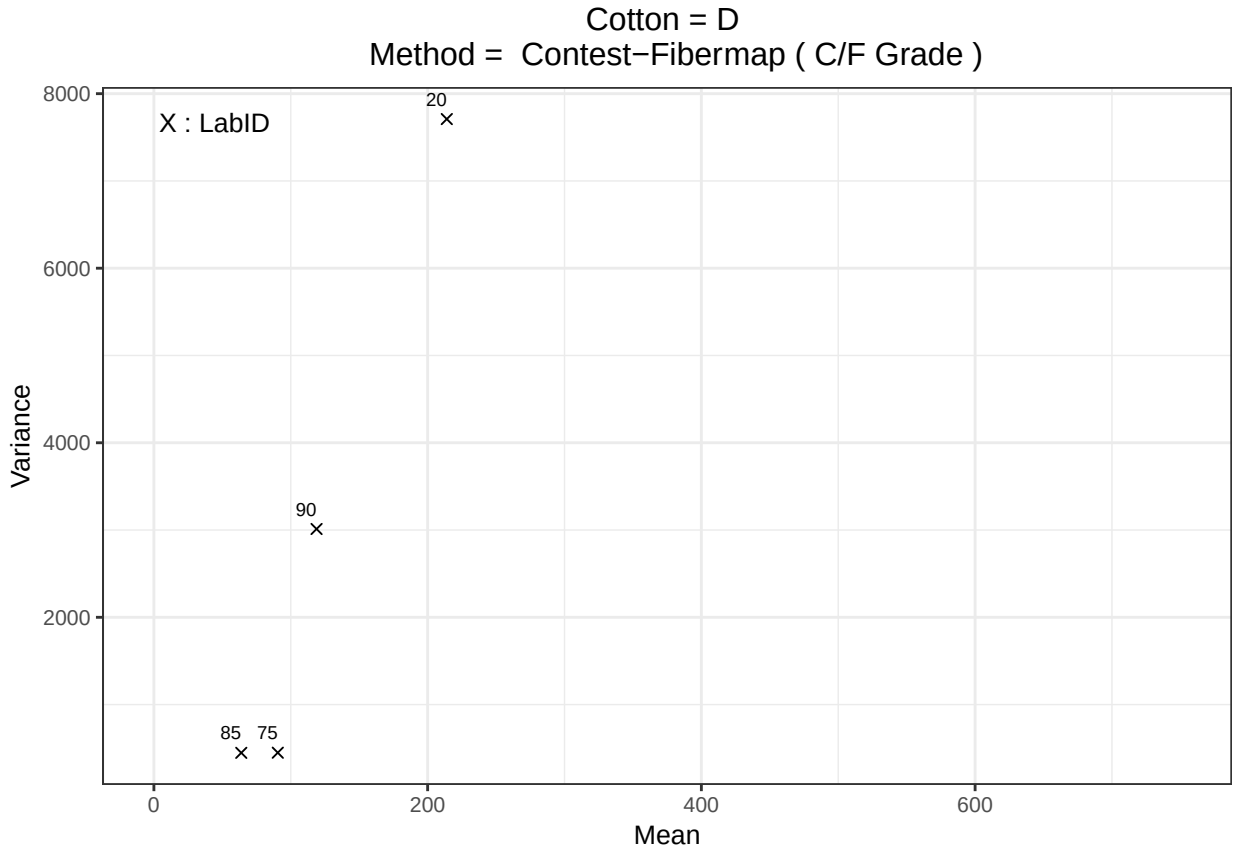

Cotton = C
Method = SCT (Sticky points)
X : LabID
155
55
70
5
60
40
30
120
45
Variance
Mean
0
10
20
30
0
50
100
150

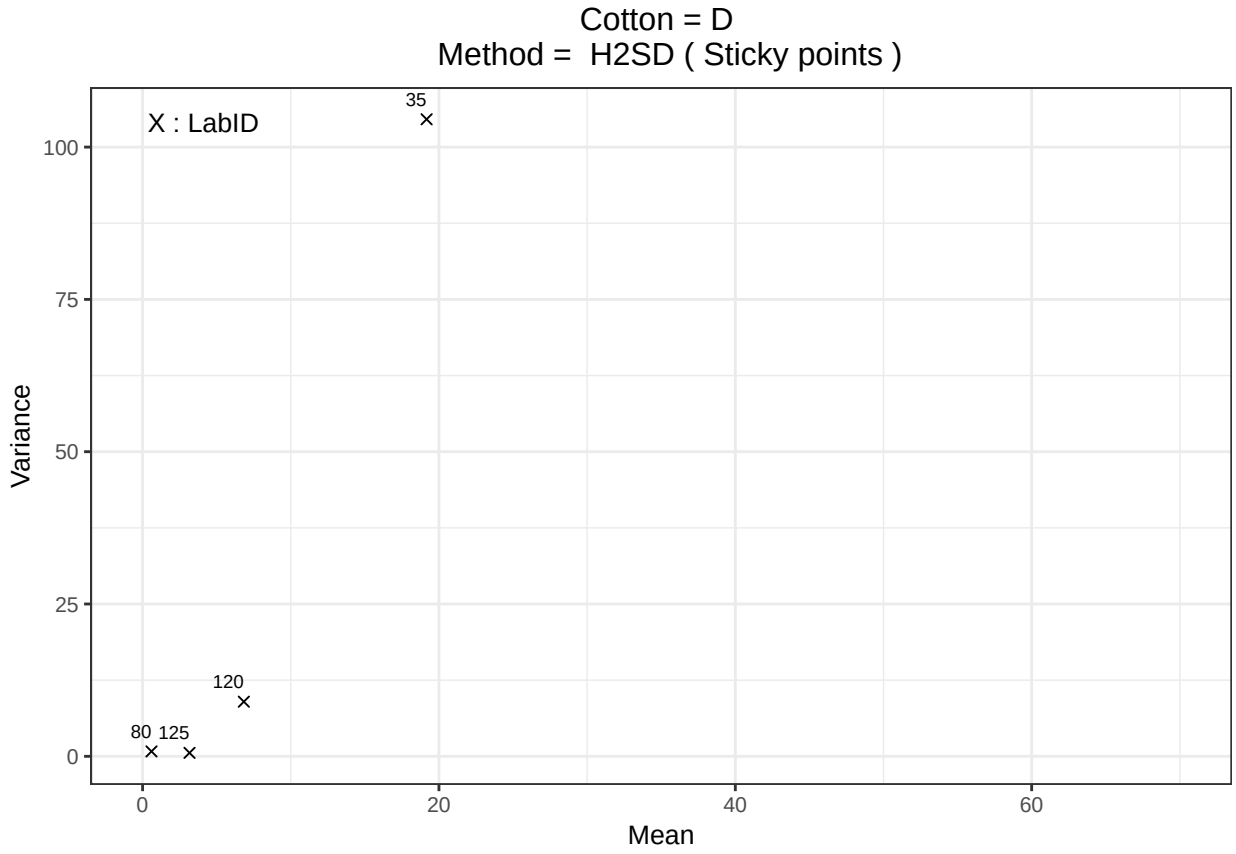
Cotton D : Variance between individual measurements = f(Mean) for all concerned labs

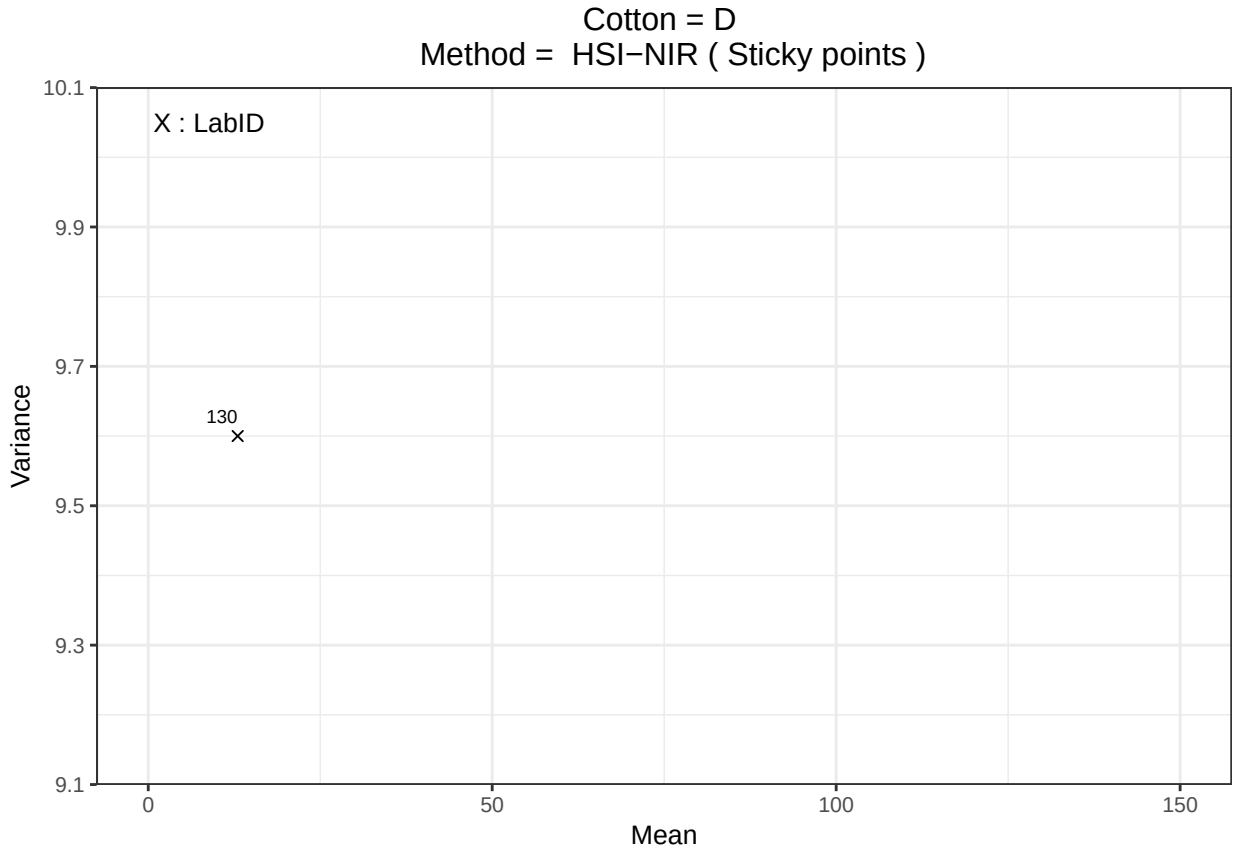


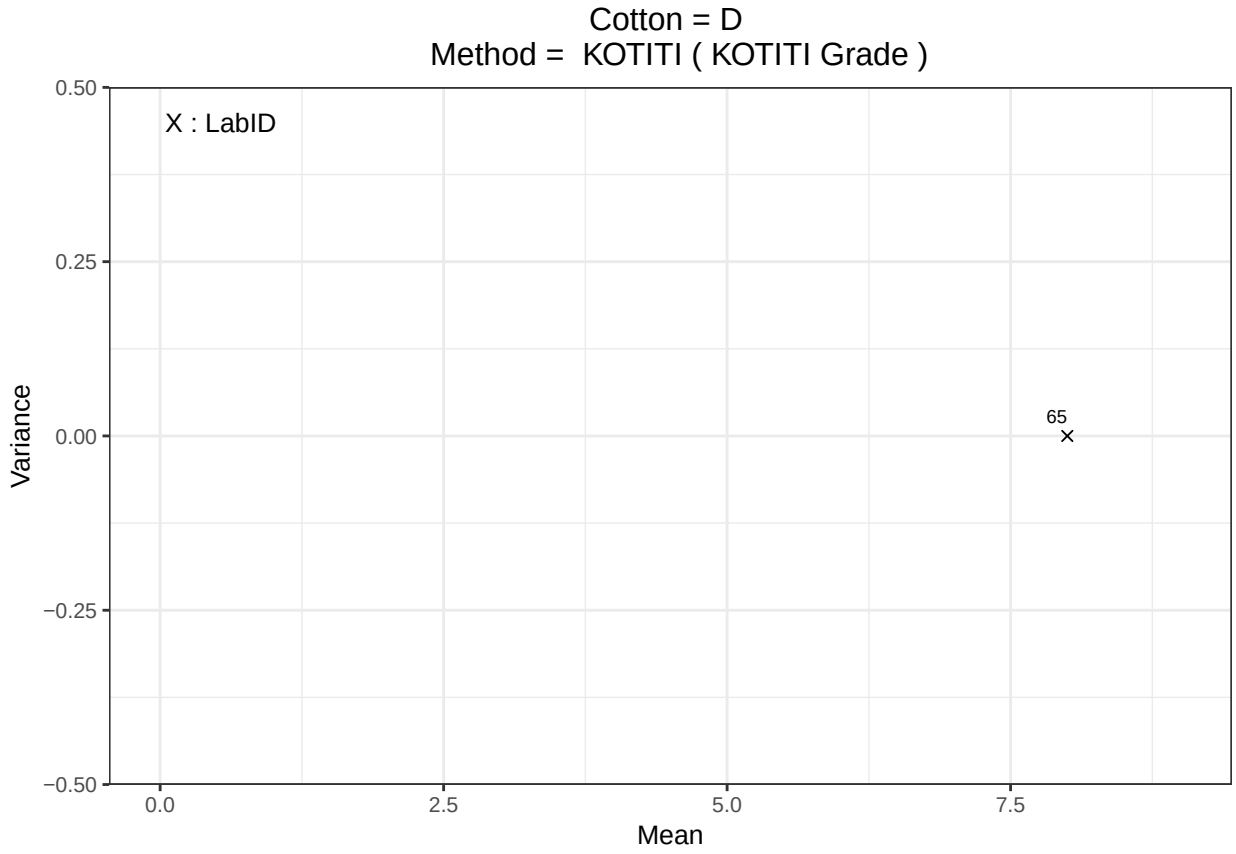
[1] "For Cotton = D and for method = Caramelization , 3 LabID (LabID being , 135, 140, 150) cannot be shown on this chart as only one measurement was performed and, therefore, a variance cannot be calculated in this case."

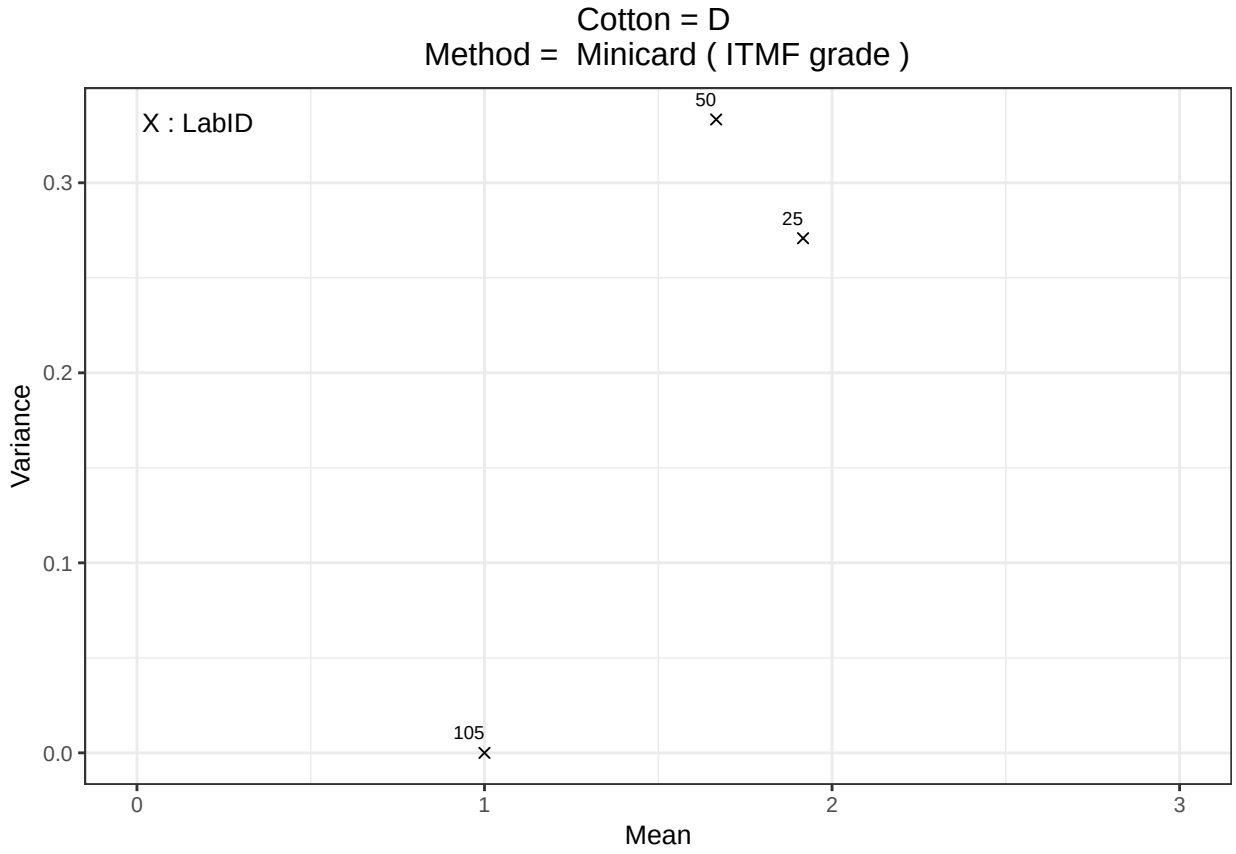

Cotton = D
Method = Clinitest (Color chart)
X : LabID
10
Variance
Mean
0.4
0.2
0.0
−0.2
−0.4
0
2
4
6

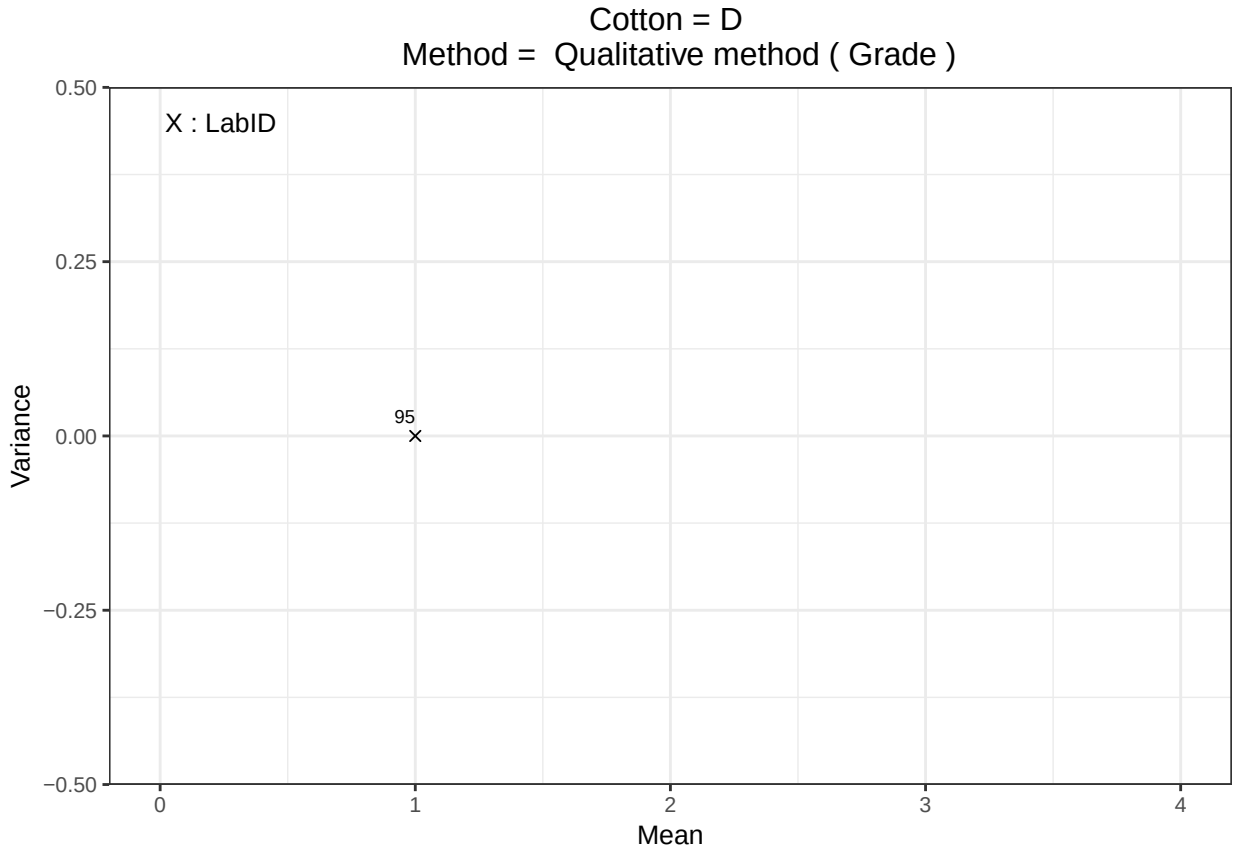

Cotton = D
Method = Contest−Fibermap (C/F Grade)
X : LabID
20
90
85
75
8000
6000
4000
2000
Variance
0
200
400
600
Mean

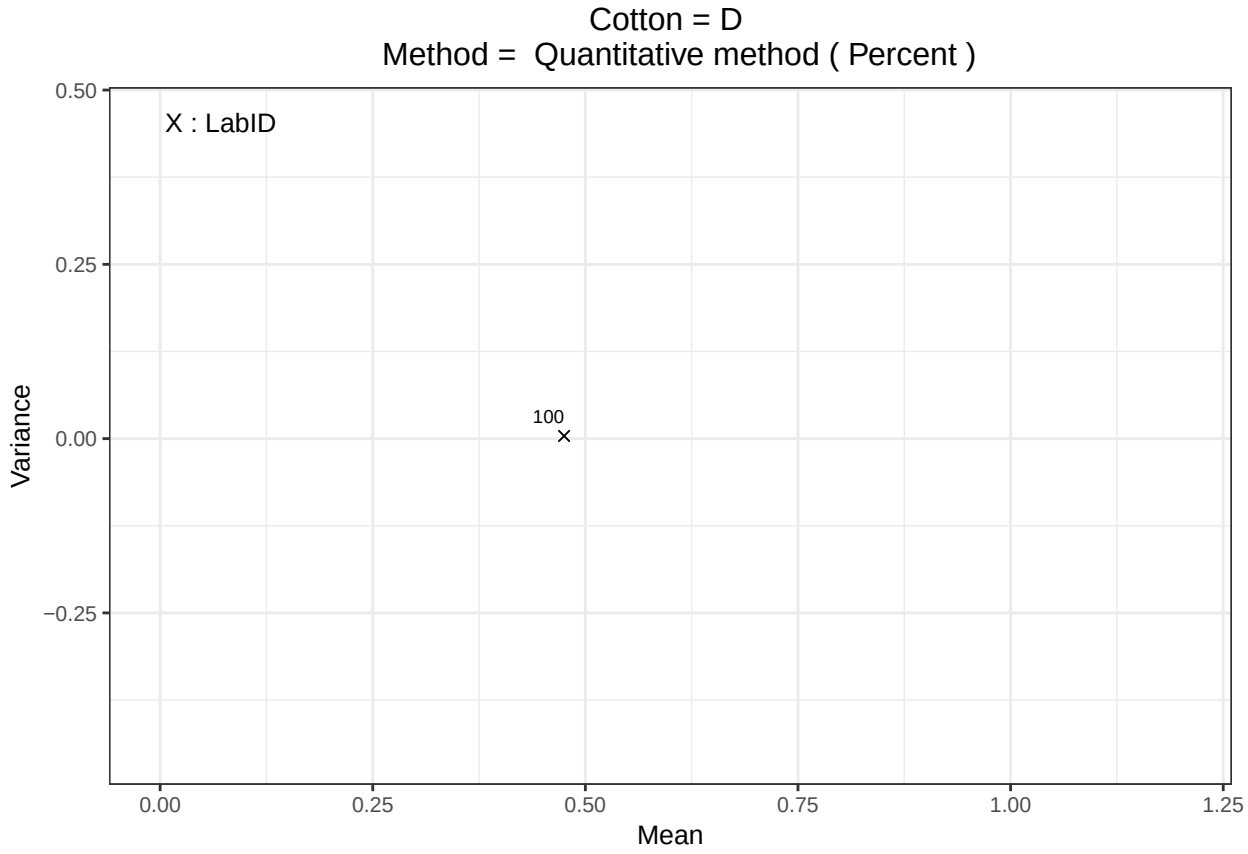

Cotton = D
Method = H2SD (Sticky points)
X : LabID
35
120
80
125
Variance
Mean
0
25
50
75
100
0
20
40
60

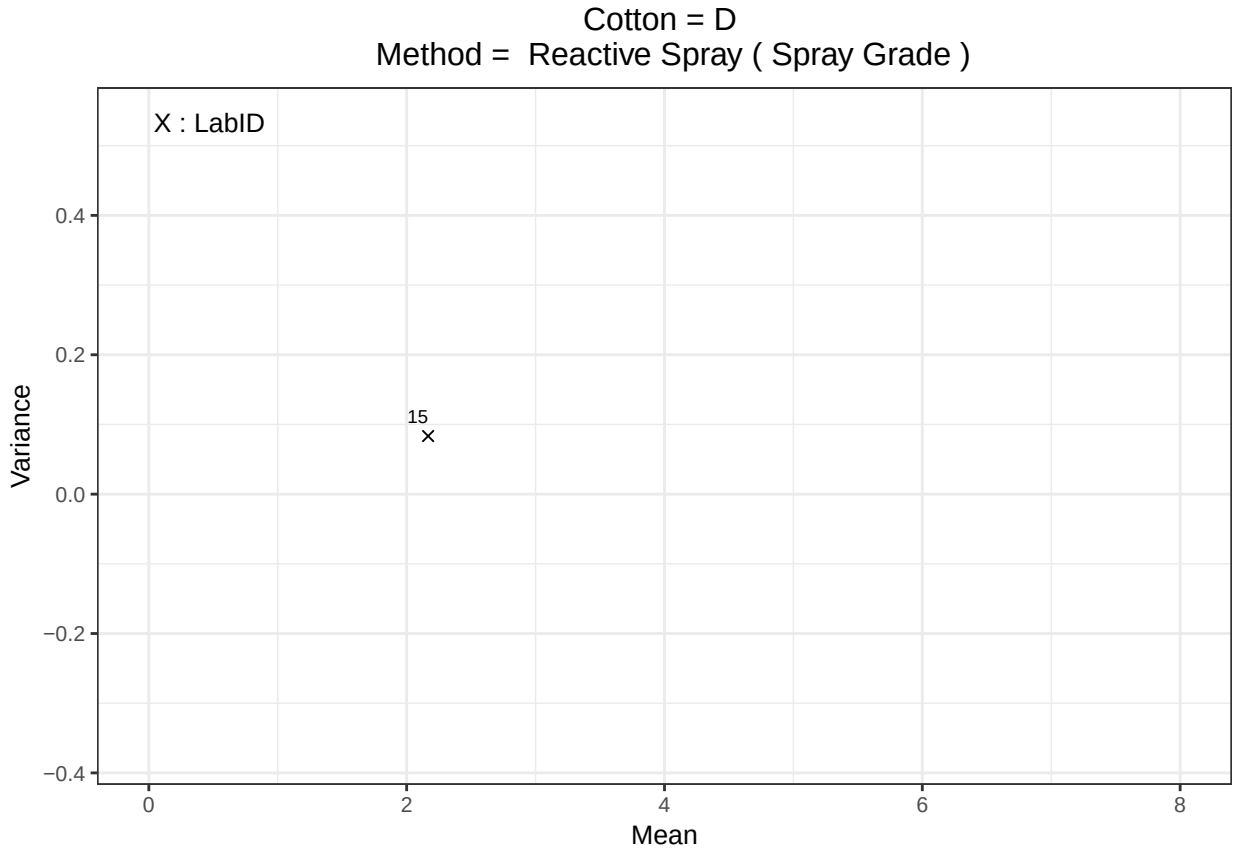

Cotton = D
Method = HSI−NIR (Sticky points)
X : LabID
130
Variance
Mean
10.1
9.9
9.7
9.5
9.3
9.1
0
50
100
150

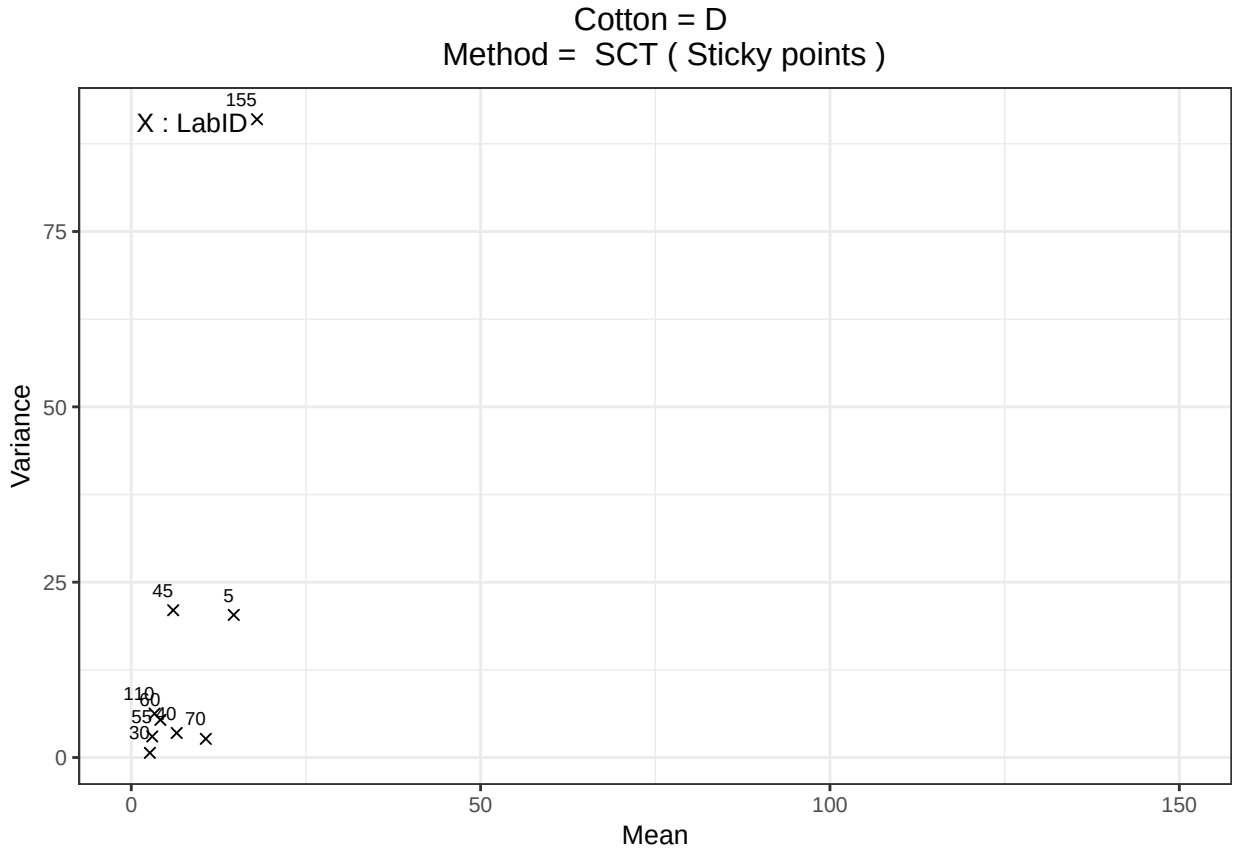

Cotton = D
Method = KOTITI (KOTITI Grade)
X : LabID
65
Variance
Mean
0.50
0.25
0.00
−0.25
−0.50
0.0
2.5
5.0
7.5


Cotton = D
Method = Minicard (ITMF grade)
X : LabID
50
25
105
0.3
0.2
0.1
0.0
Variance
0
1
2
3
Mean

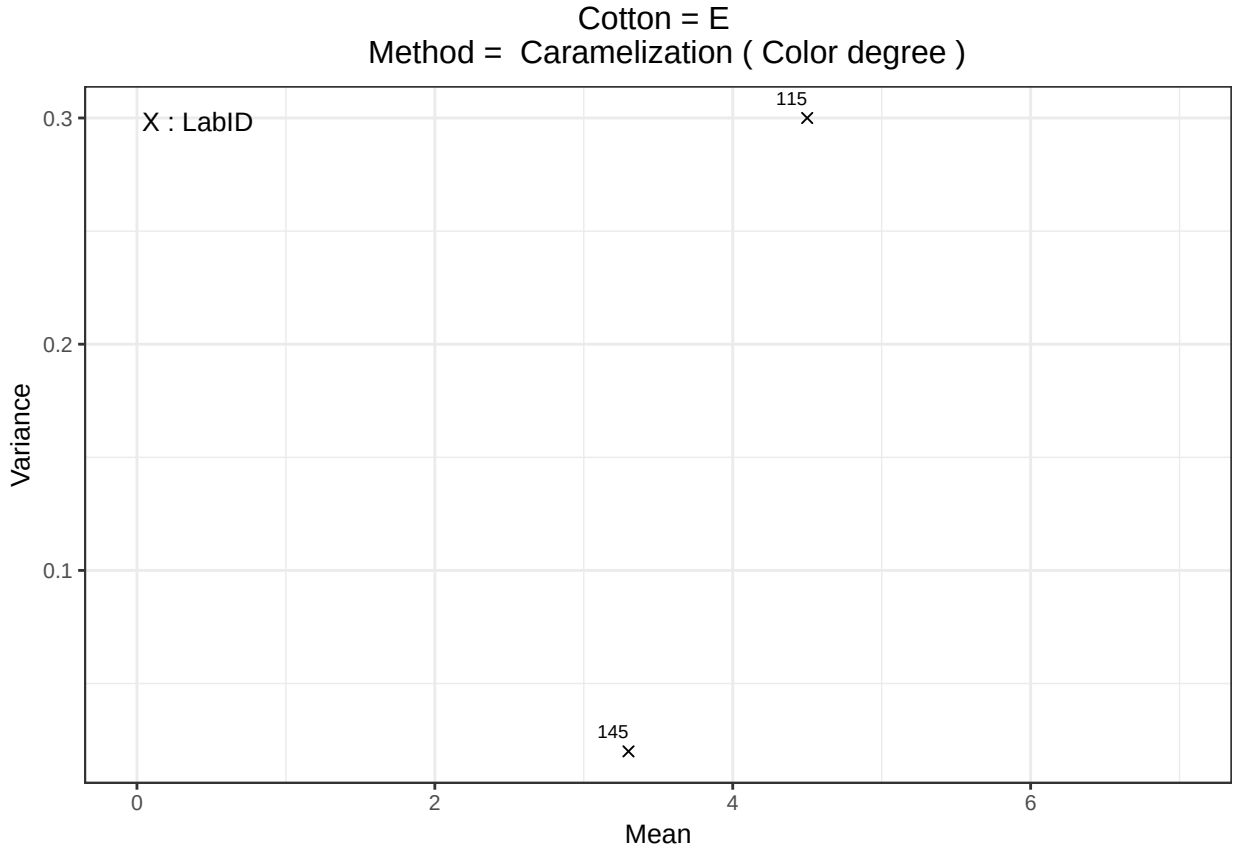

Cotton = D
Method = Qualitative method (Grade)
X : LabID
95
Variance
Mean
0.50
0.25
0.00
−0.25
−0.50
0
1
2
3
4


Cotton = D
Method = Quantitative method (Percent)
X : LabID
100
Variance
Mean
0.50
0.25
0.00
−0.25
0.00
0.25
0.50
0.75
1.00
1.25

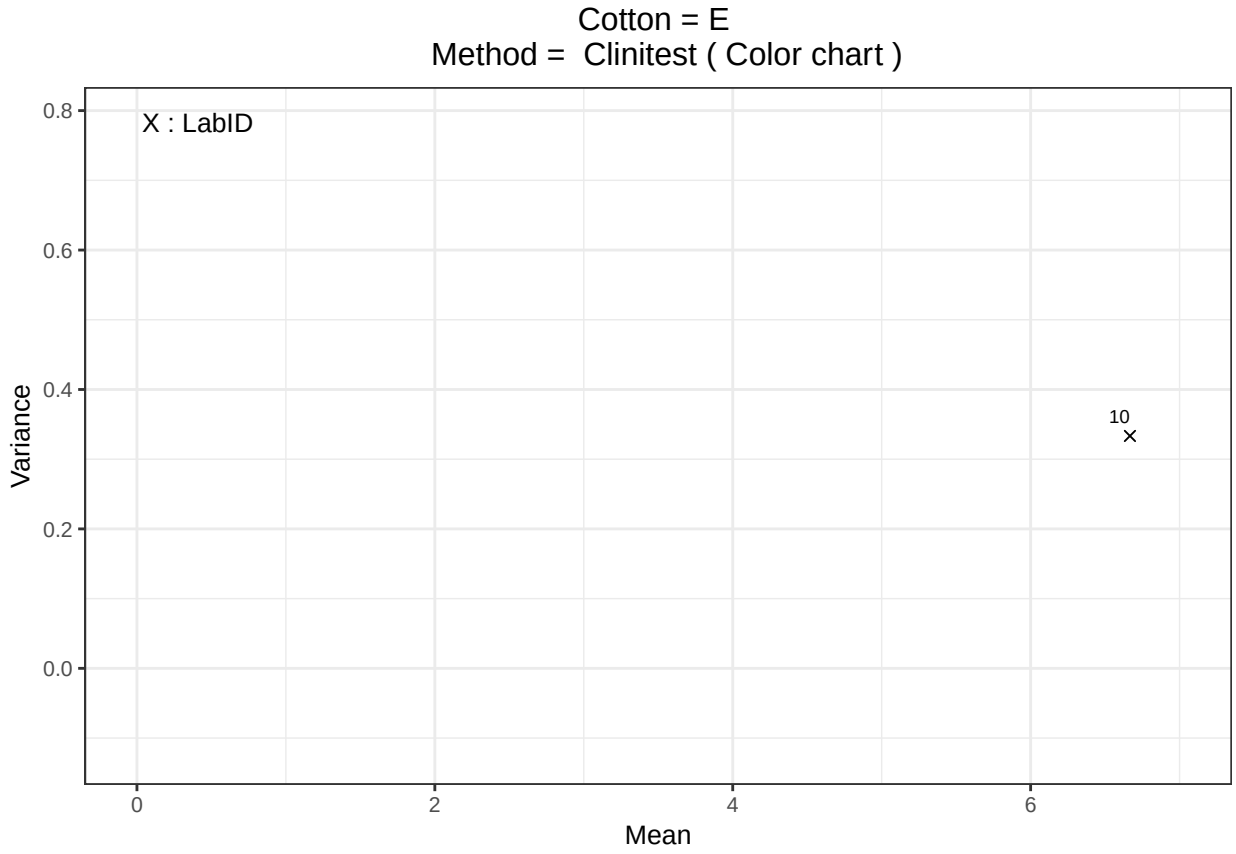

Cotton = D
Method = Reactive Spray (Spray Grade)
X : LabID
15
Variance
Mean
0.4
0.2
0.0
−0.2
−0.4
0
2
4
6
8

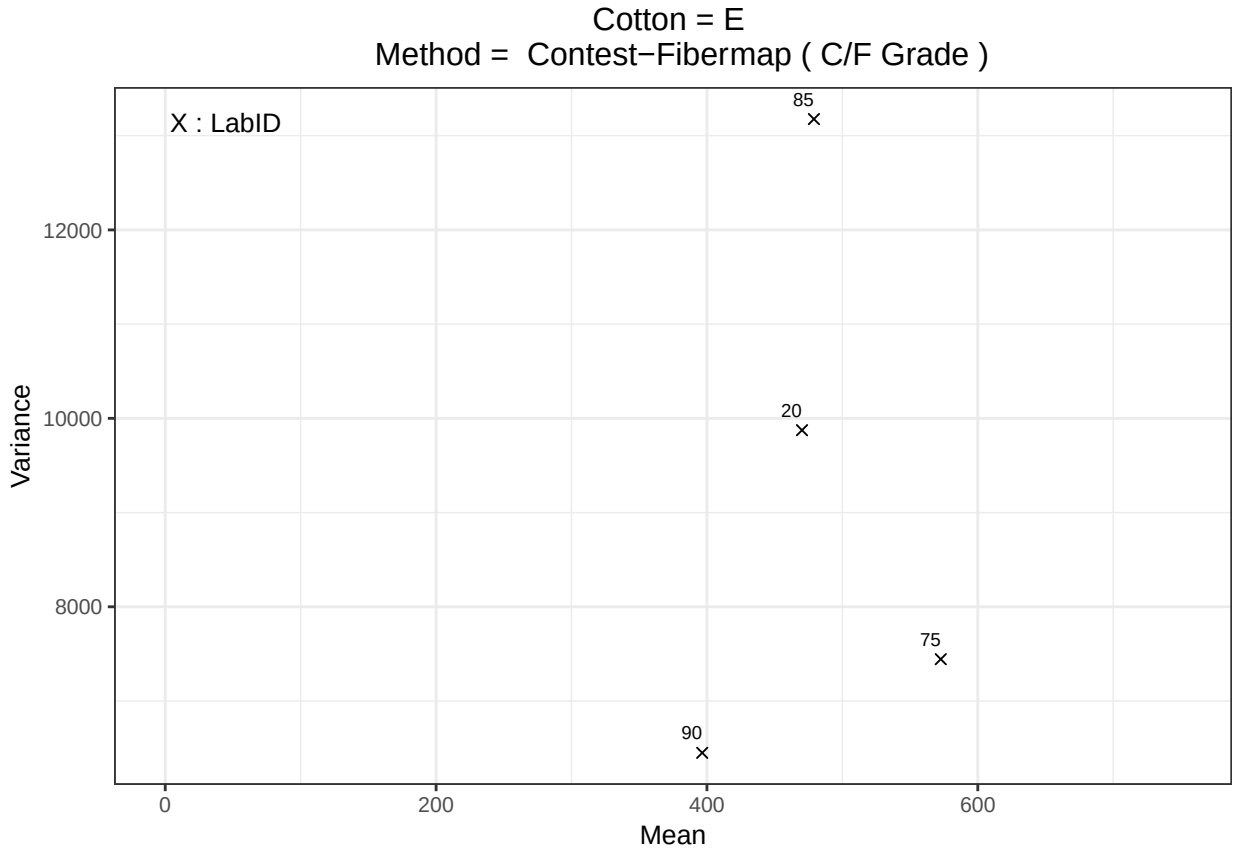

Cotton = D
Method = SCT (Sticky points)
X : LabID
155
45
5
110
60
55
24
40
70
30
Variance
Mean
0
25
50
75
0
50
100
150

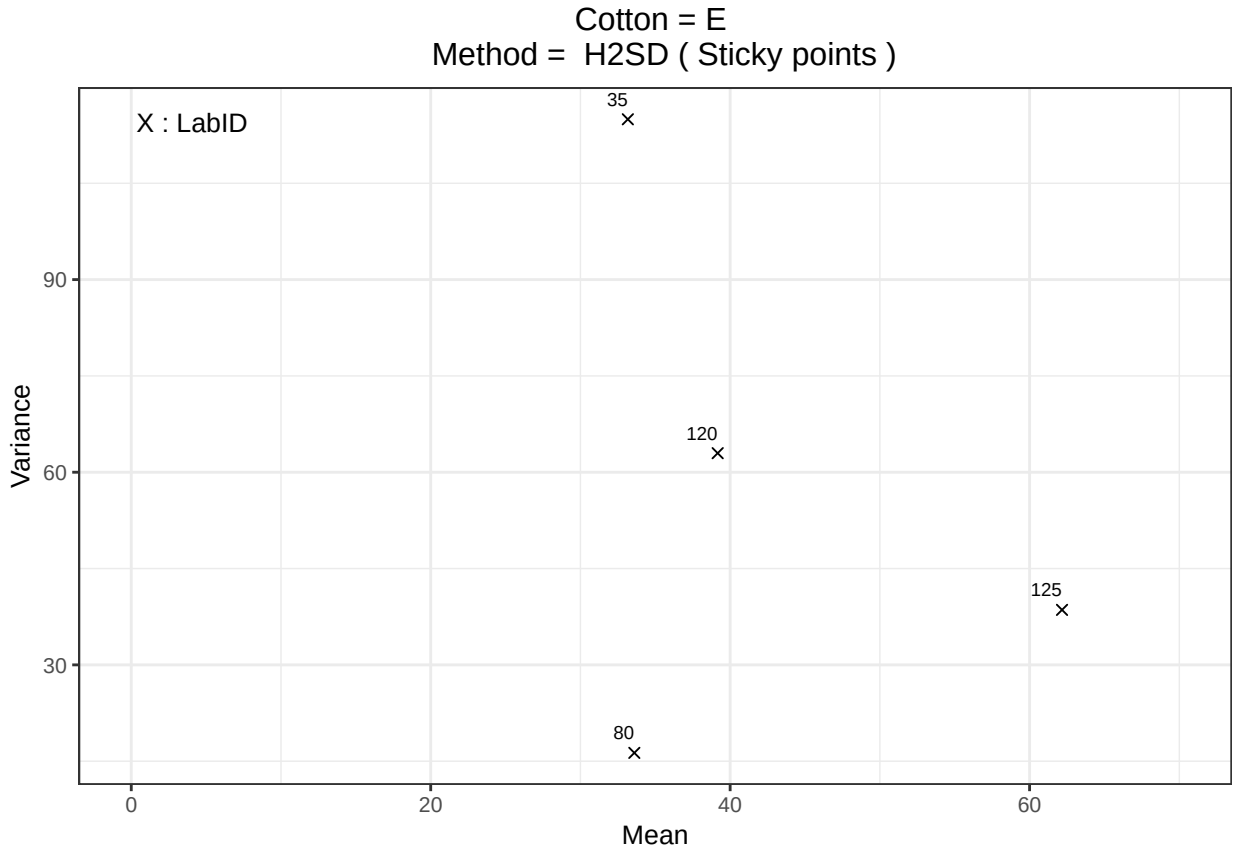
Cotton E : Variance between individual measurements = f(Mean) for all concerned labs

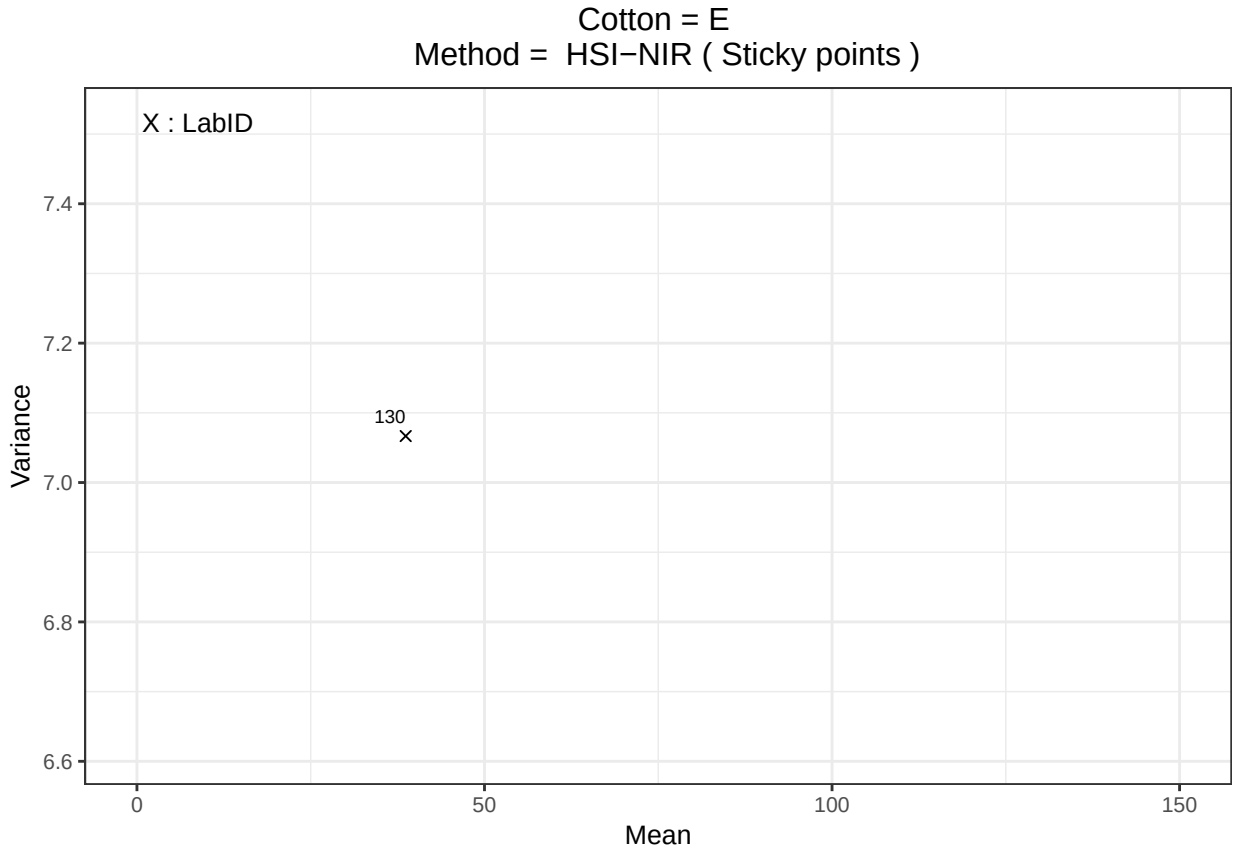


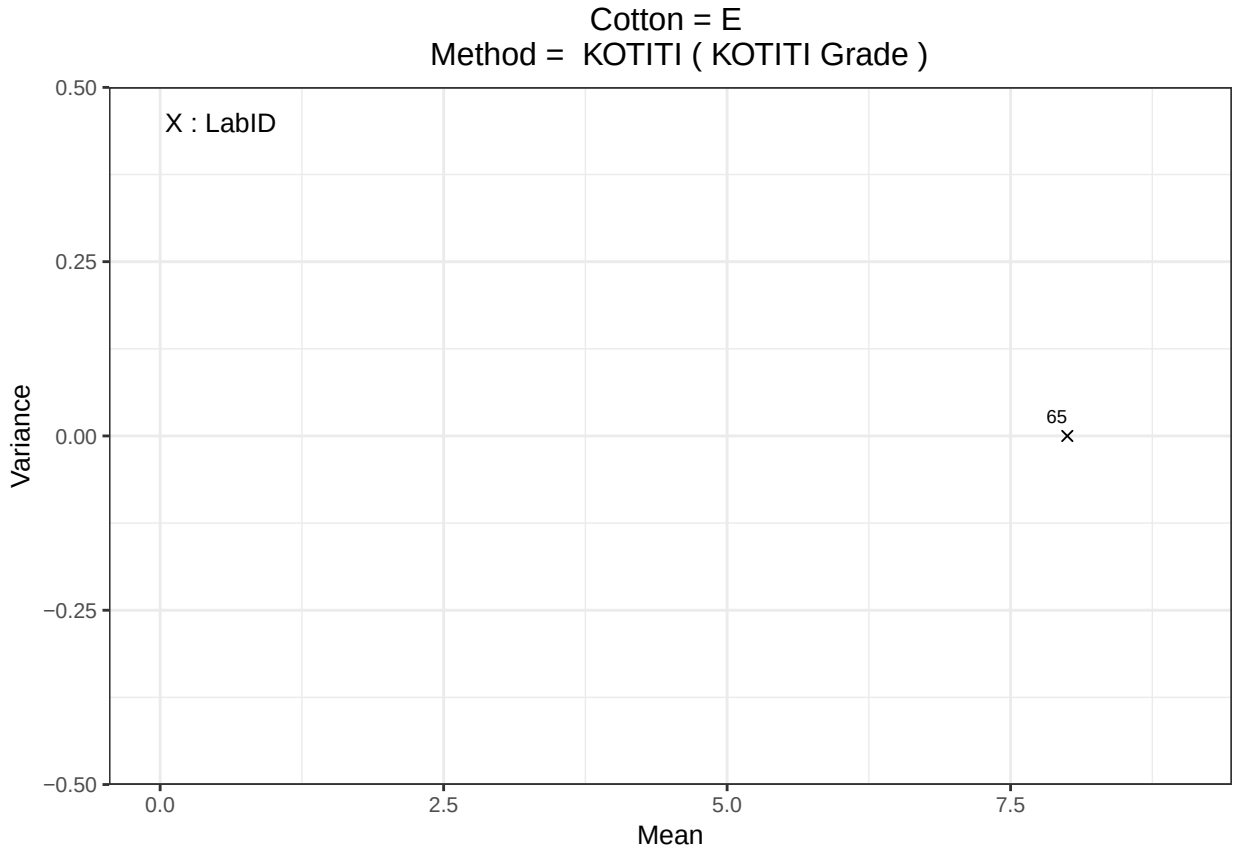
[1] "For Cotton = E and for method = Caramelization , 3 LabID (LabID being , 135, 140, 150) cannot be shown on this chart as only one measurement was performed and, therefore, a variance cannot be calculated in this case."

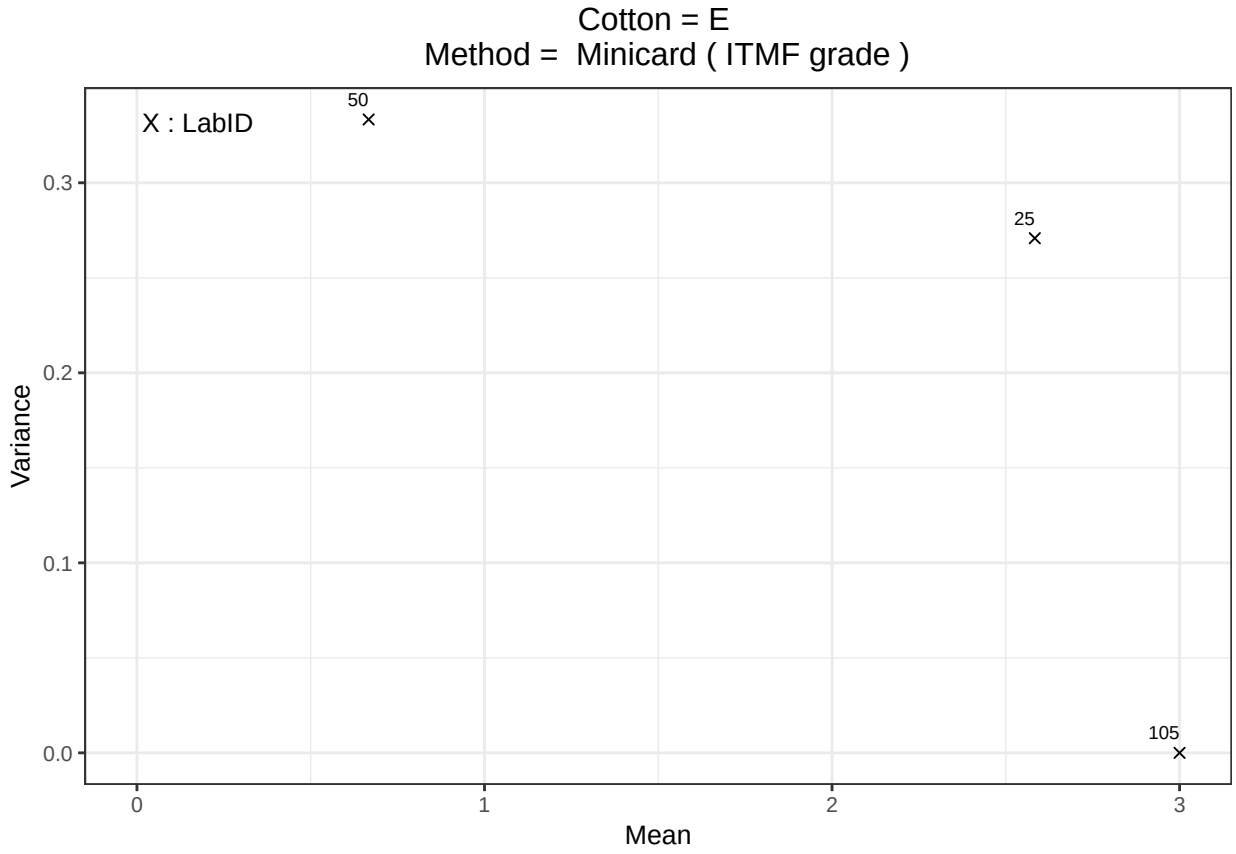

Cotton = E
Method = Clinitest (Color chart)
X : LabID
Variance
Mean
0.0
0.2
0.4
0.6
0.8
0
2
4
6
10

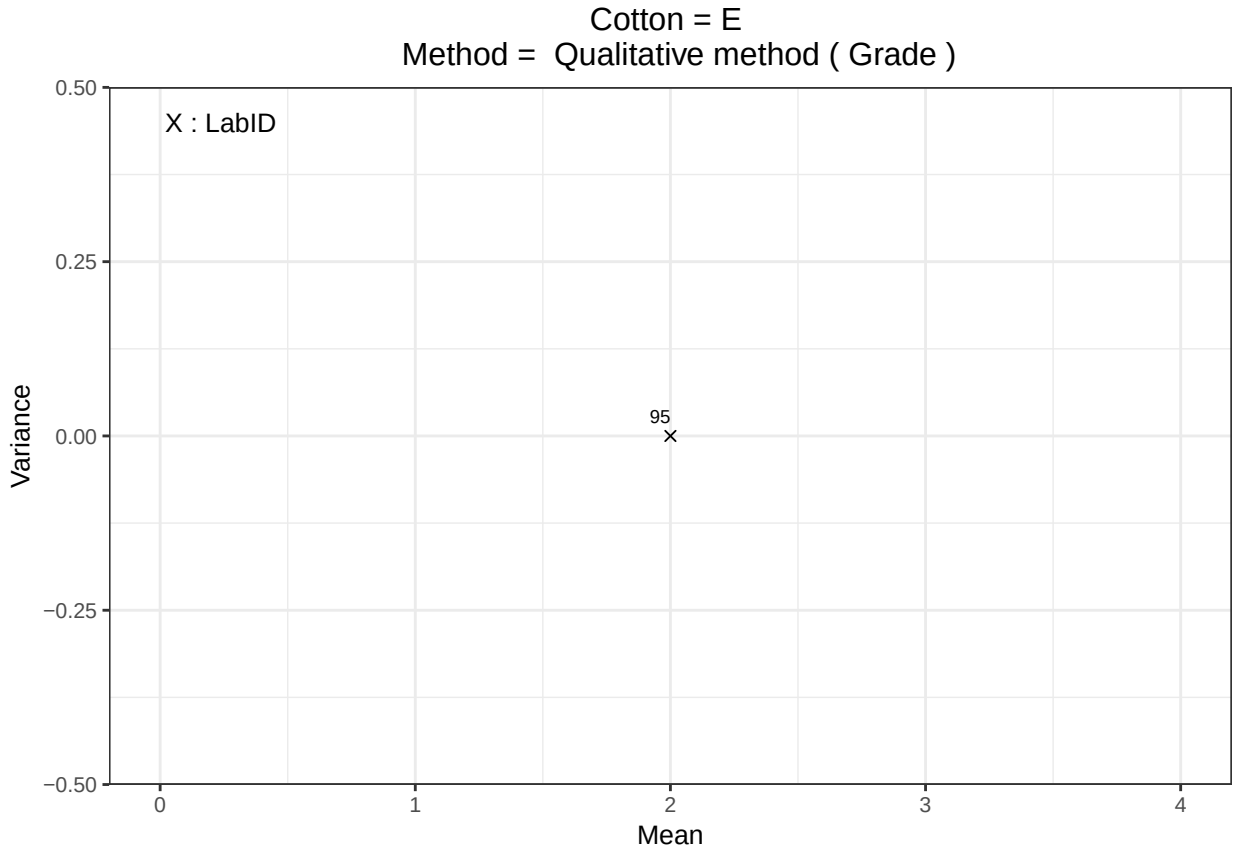

Cotton = E
Method = Contest−Fibermap (C/F Grade)
X : LabID
85
20
75
90
12000
10000
8000
Variance
0
200
400
600
Mean

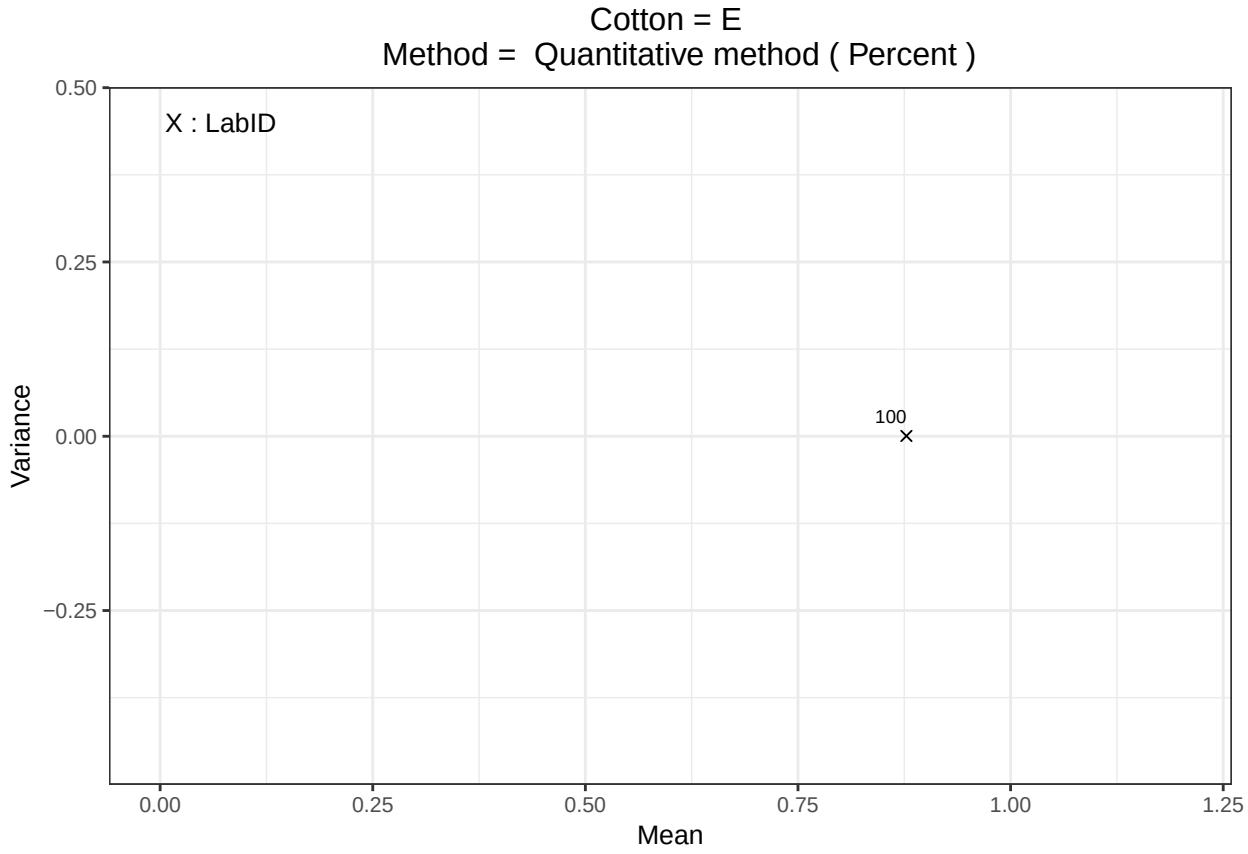

Cotton = E
Method = H2SD (Sticky points)
X : LabID
35
120
125
80
90
60
30
Variance
0
20
40
60
Mean

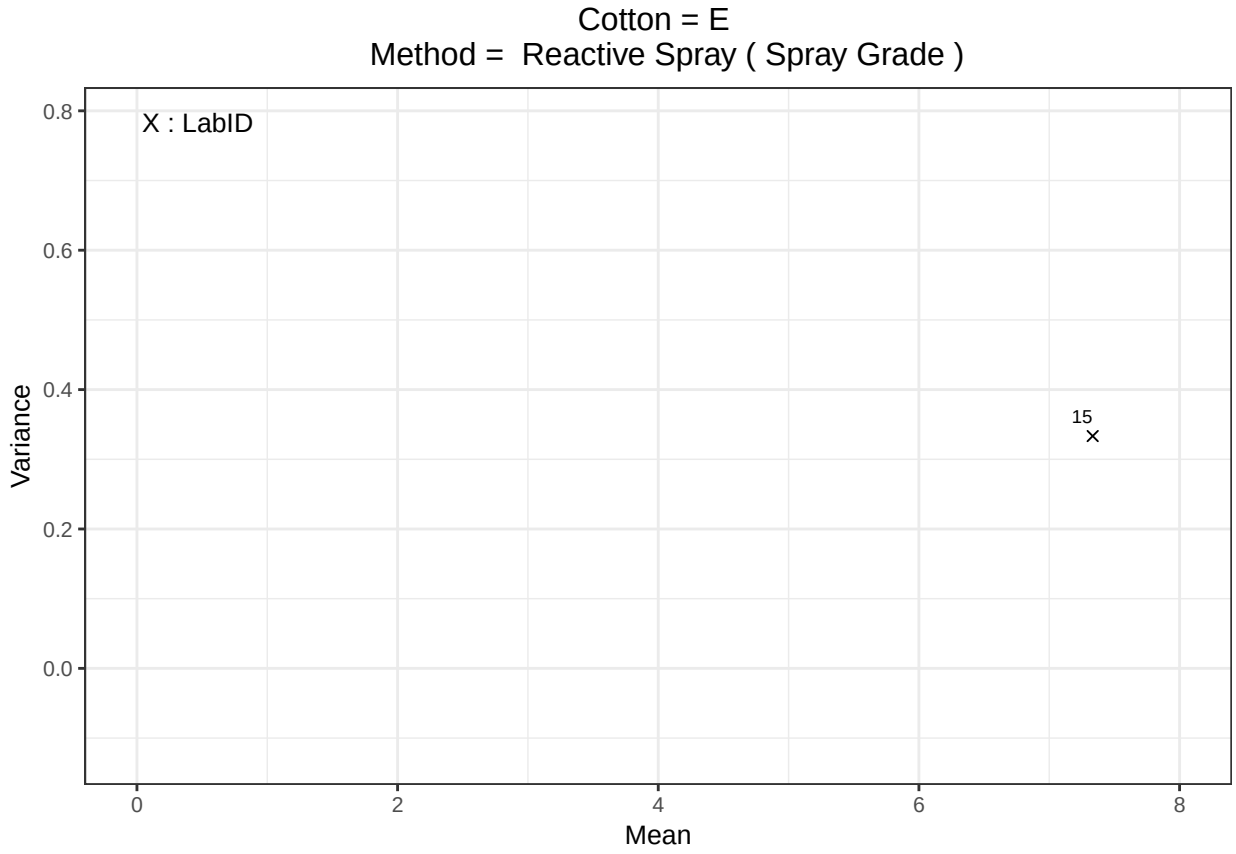

Cotton = E
Method = HSI−NIR (Sticky points)
X : LabID
130
Variance
7.4
7.2
7.0
6.8
6.6
0
50
100
150
Mean

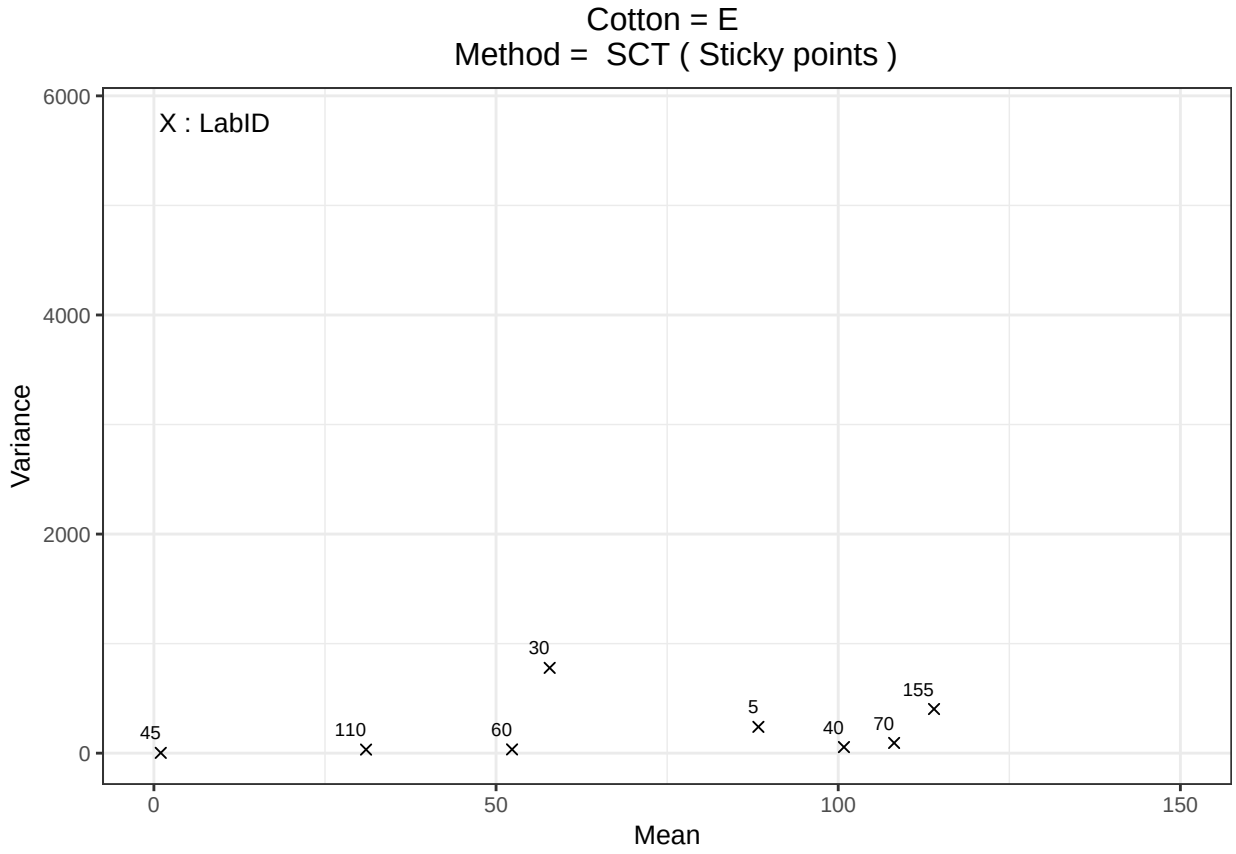

Cotton = E
Method = KOTITI (KOTITI Grade)
X : LabID
65
Variance
Mean
0.50
0.25
0.00
−0.25
−0.50
0.0
2.5
5.0
7.5


Cotton = E
Method = Minicard (ITMF grade)
X : LabID
50
25
105
Variance
0.0
0.1
0.2
0.3
Mean
0
1
2
3


Cotton = E
Method = Qualitative method (Grade)
X : LabID
95
Variance
Mean
0.50
0.25
0.00
−0.25
−0.50
0
1
2
3
4


Cotton = E
Method = Quantitative method (Percent)
X : LabID
100
Variance
Mean
0.50
0.25
0.00
−0.25
0.00
0.25
0.50
0.75
1.00
1.25

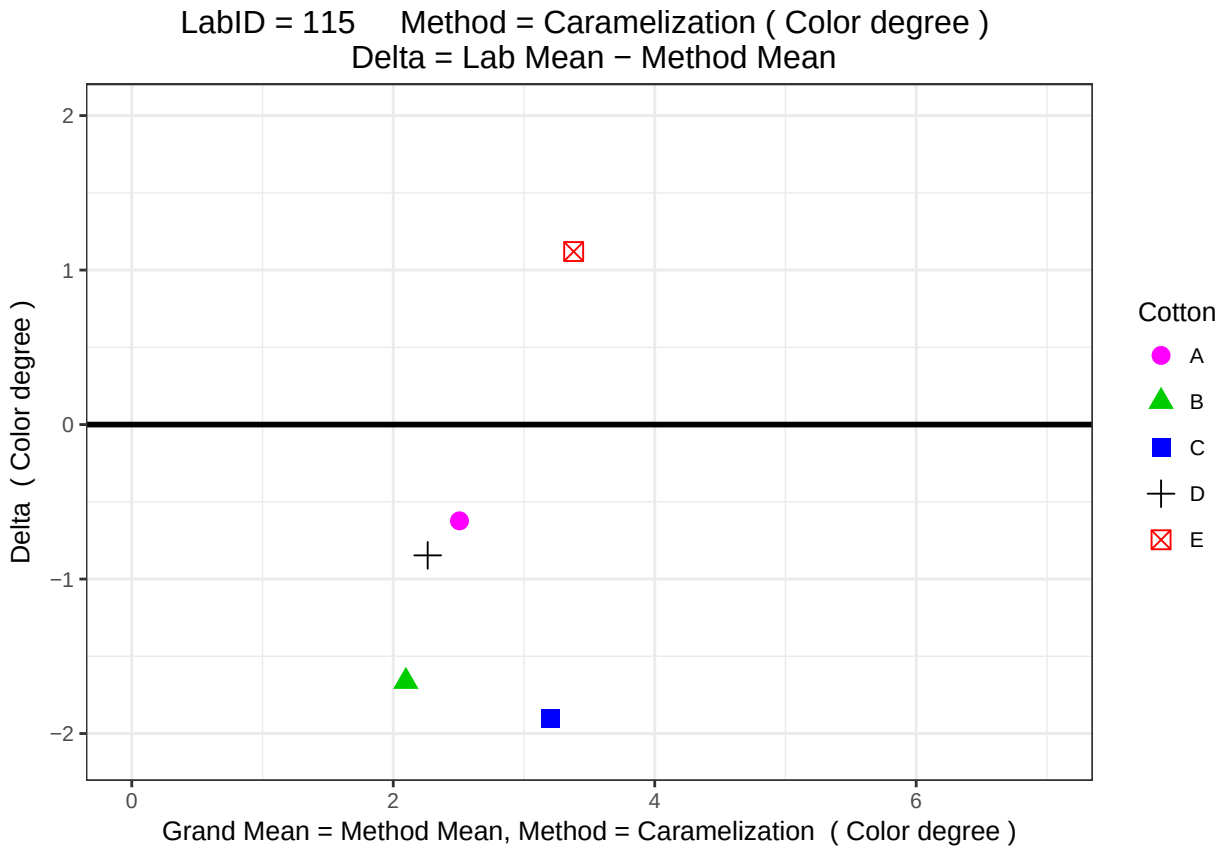

Cotton = E
Method = Reactive Spray (Spray Grade)
X : LabID
Variance
Mean
0.0
0.2
0.4
0.6
0.8
0
2
4
6
8
15


Cotton = E
Method = SCT (Sticky points)
X : LabID
Variance
Mean
6000
4000
2000
0
0
50
100
150
45
110
60
30
5
40
70
155

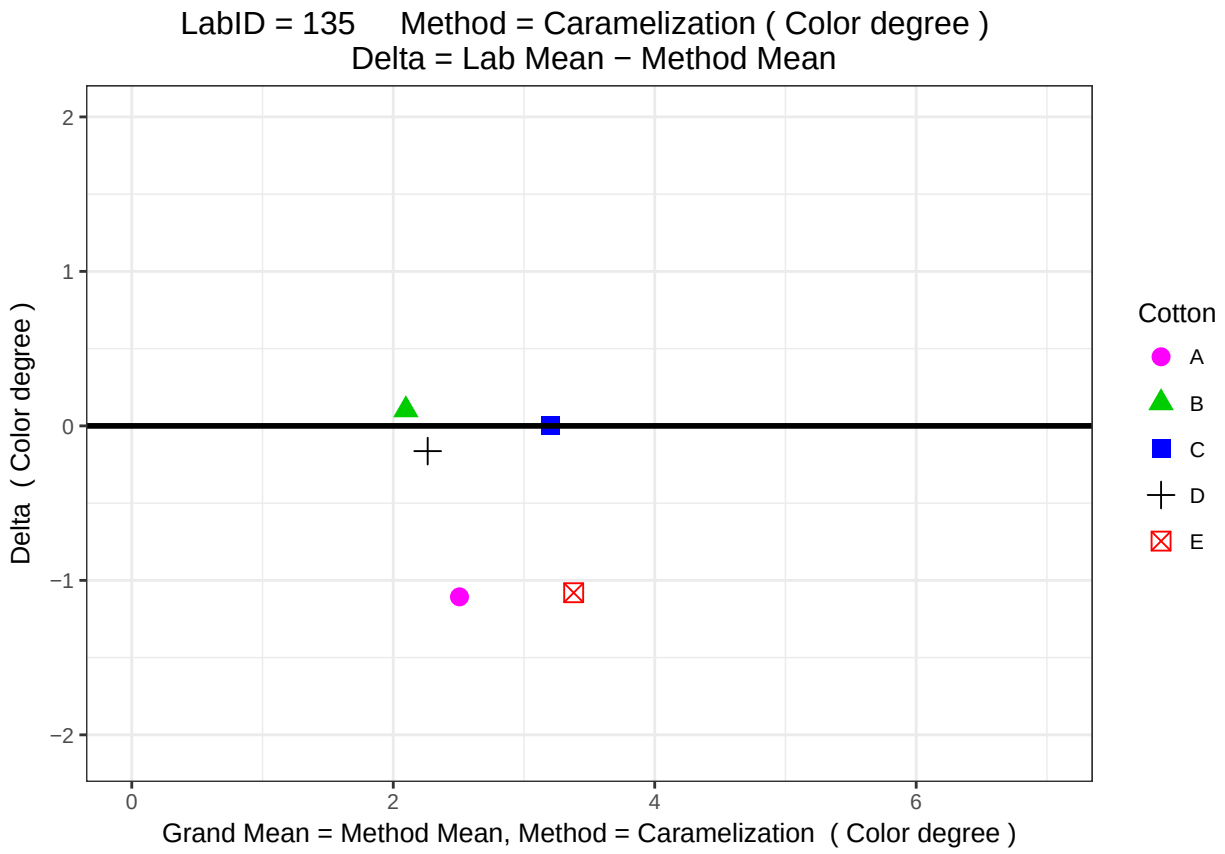
CSITC type charts: distance Delta of Lab readings to the Grand Mean by Method and by LabID [6]

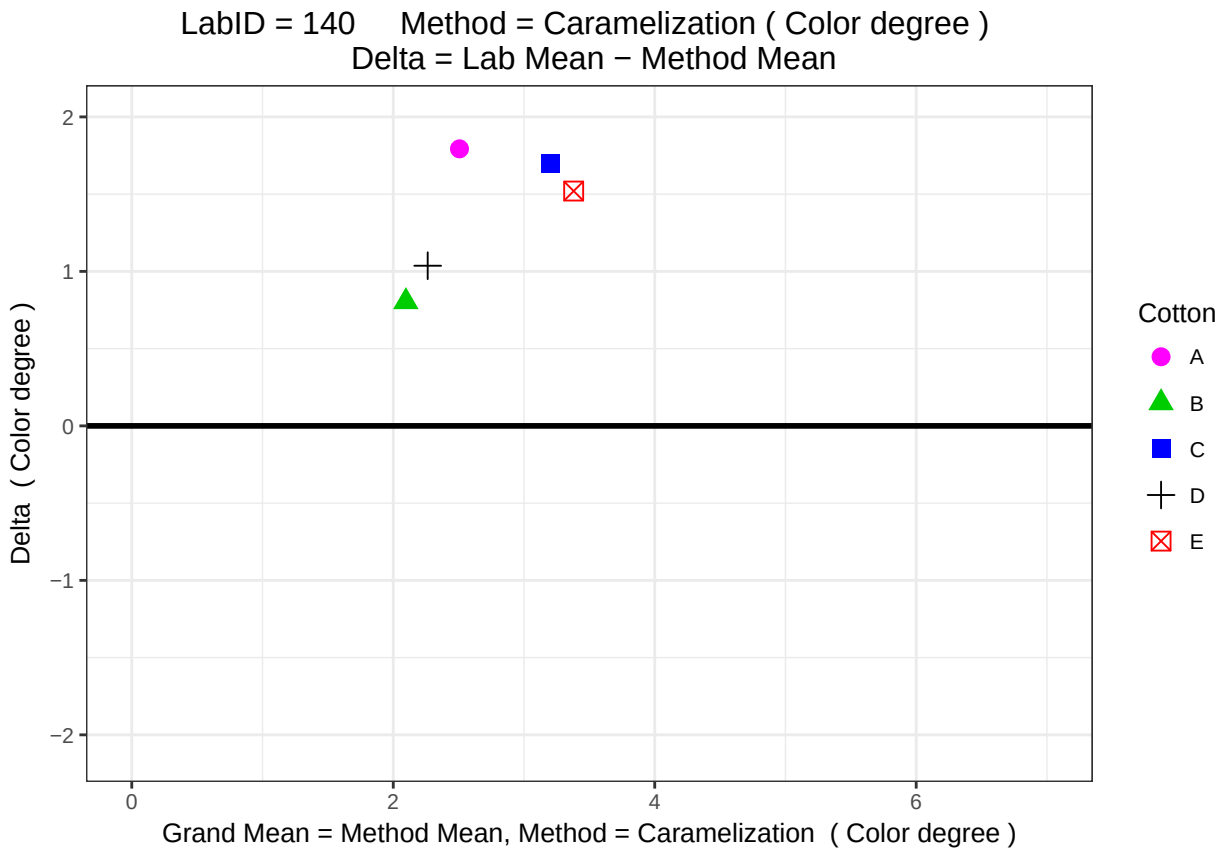
This type of chart is devoted to displaying the ability of any Method and any LabID to not deviate from the observed GrandMean of any given characteristic whatever the measured levels of the participating cottons, and then covering the range of stickiness of the participating cottons in this case. If only one LabId is using a given Method, then all Delta points (one point per participating cotton) will be positionned at Delta = 0 (Y axis) and at the GrandMean values of the cottons (X axis). If two labs are using a given Method, then their resepctive Delta points will be positionned in symetry of the X axis at the respective Delta values (Y axis) and at the GrandMean values of the cottons (on the X axis).

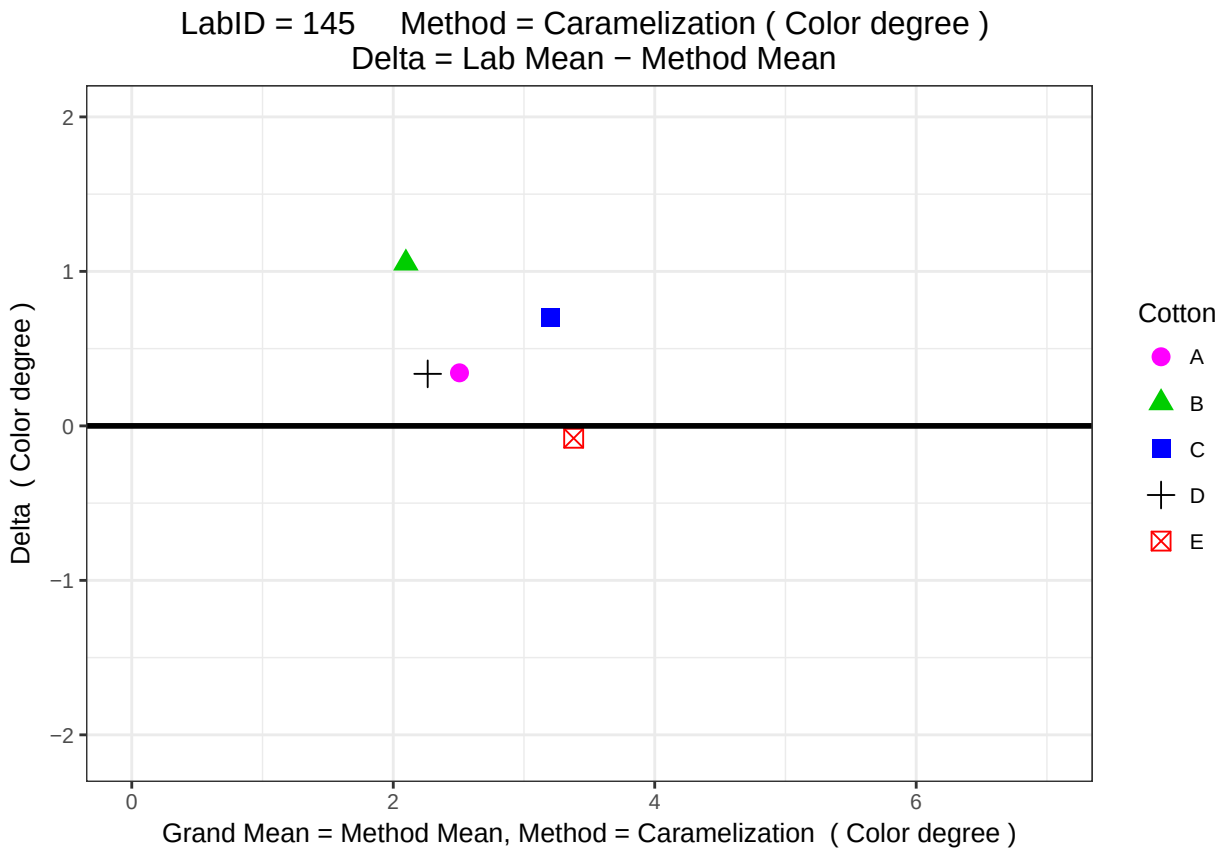
CSITC type chart for Method Caramelization

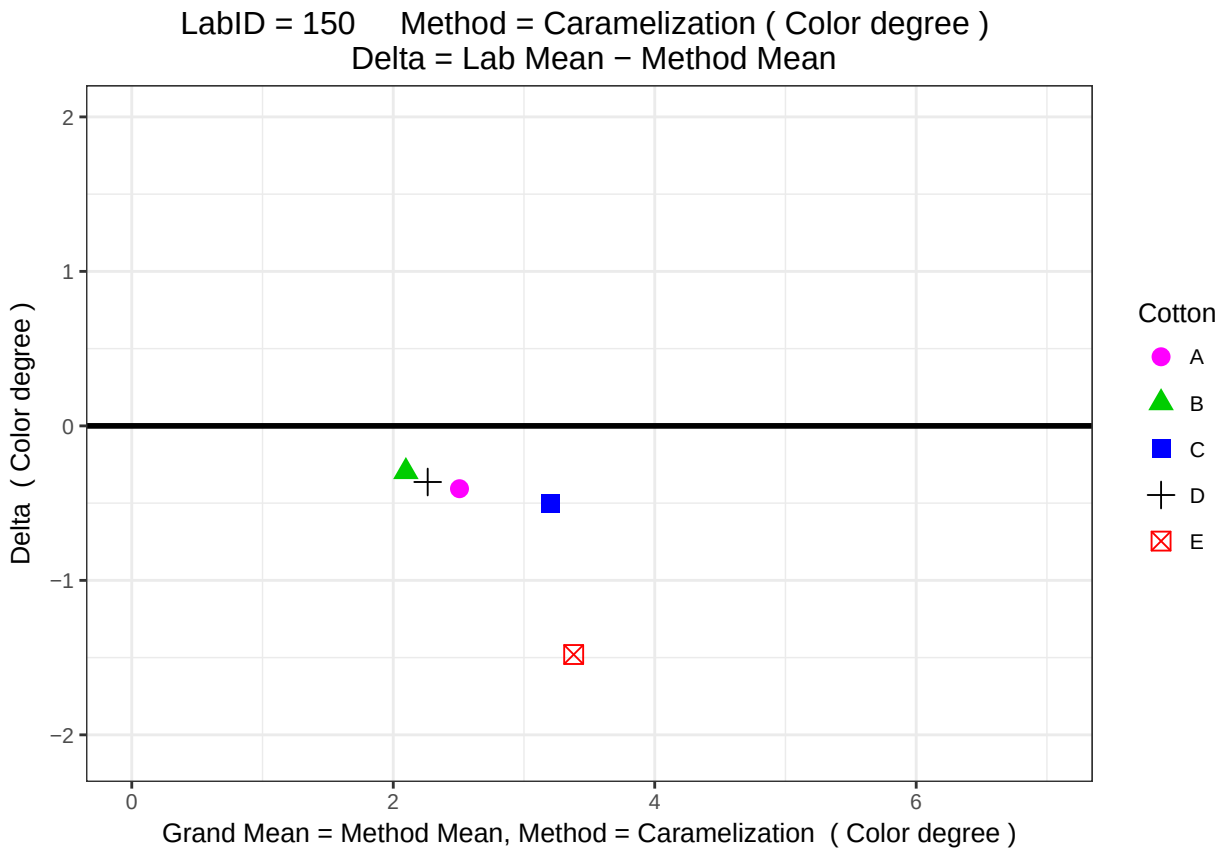


[6]Footnote
* GMean = Grand Mean of all laboratory means, calculated by Method.
* Chart abscissa axis is given in the original individual readings scale.

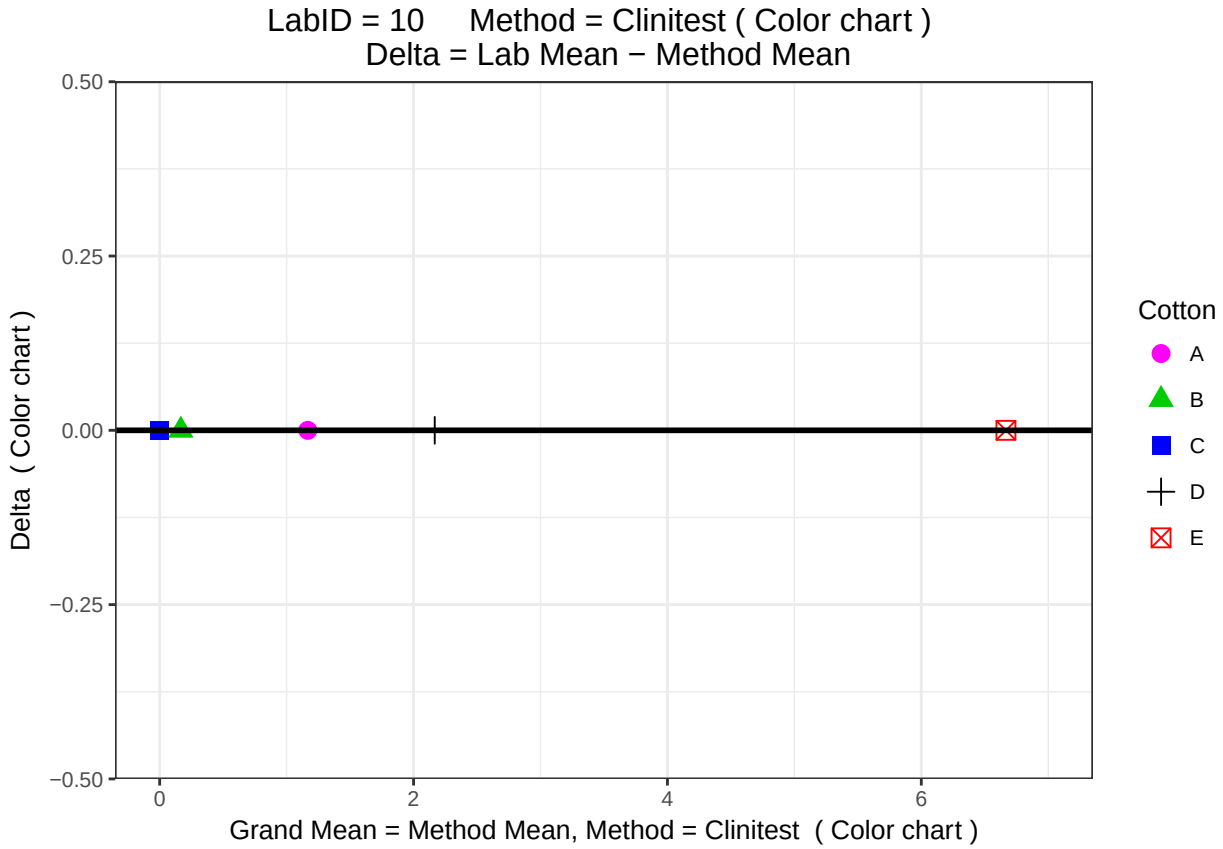

LabID = 135 Method = Caramelization (Color degree)
Delta = Lab Mean − Method Mean
Delta (Color degree)
2
1
0
−1
−2
0
2
4
6
Grand Mean = Method Mean, Method = Caramelization (Color degree)
Cotton
A
B
C
D
E


LabID = 140 Method = Caramelization (Color degree)
Delta = Lab Mean − Method Mean
Delta (Color degree)
2
1
0
−1
−2
0
2
4
6
Grand Mean = Method Mean, Method = Caramelization (Color degree)
Cotton
A
B
C
D
E

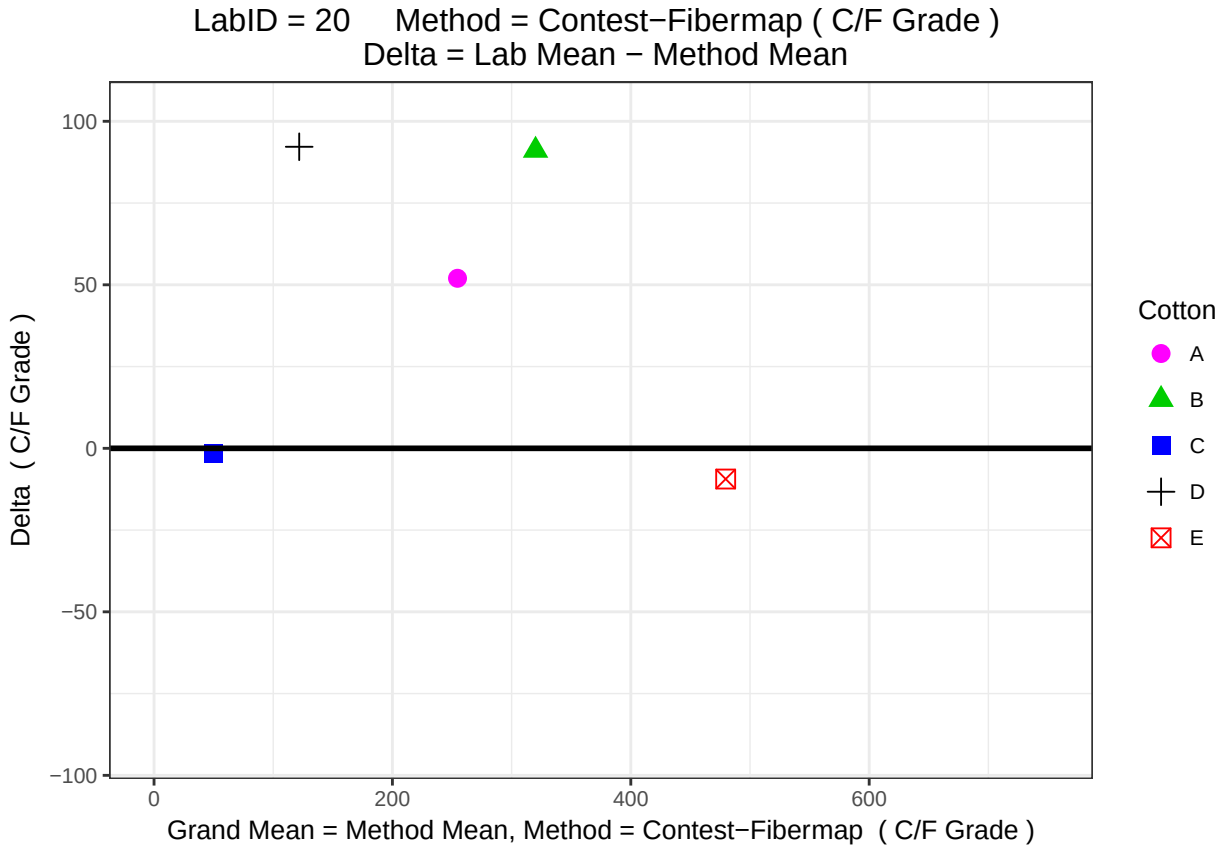

LabID = 145 Method = Caramelization (Color degree)
Delta = Lab Mean − Method Mean
Delta (Color degree)
2
1
0
−1
−2
0
2
4
6
Grand Mean = Method Mean, Method = Caramelization (Color degree)
Cotton
A
B
C
D
E

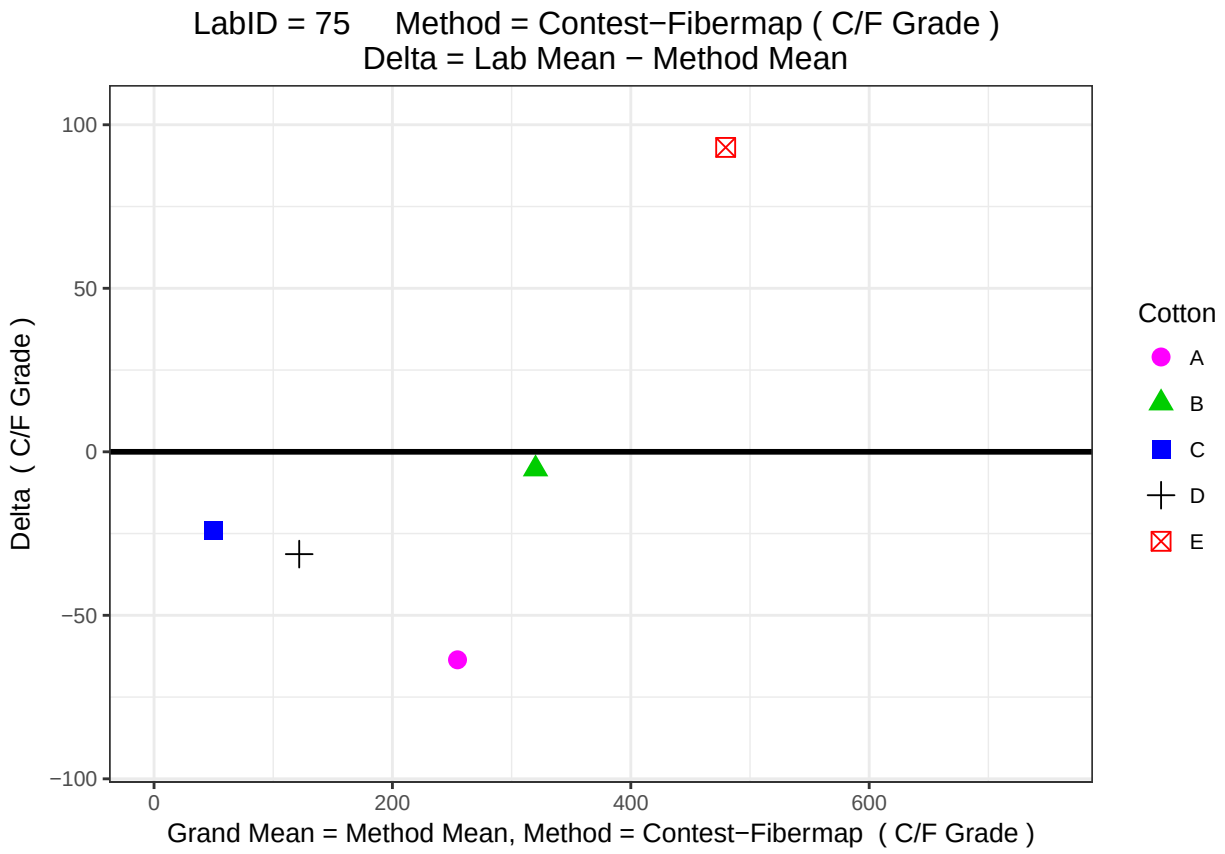

LabID = 150 Method = Caramelization (Color degree)
Delta = Lab Mean − Method Mean
Delta (Color degree)
2
1
0
−1
−2
0
2
4
6
Grand Mean = Method Mean, Method = Caramelization (Color degree)
Cotton
A
B
C
D
E

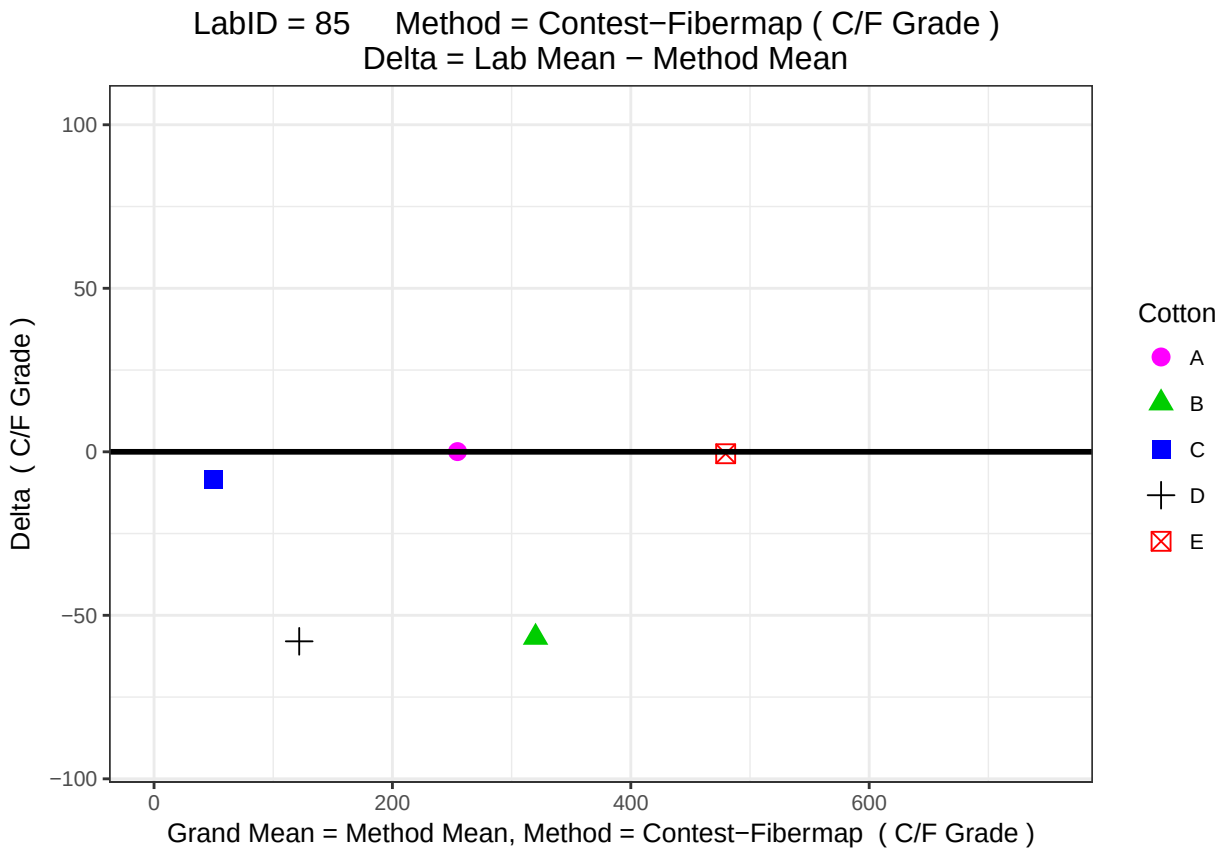
CSITC type chart for Method Clinitest

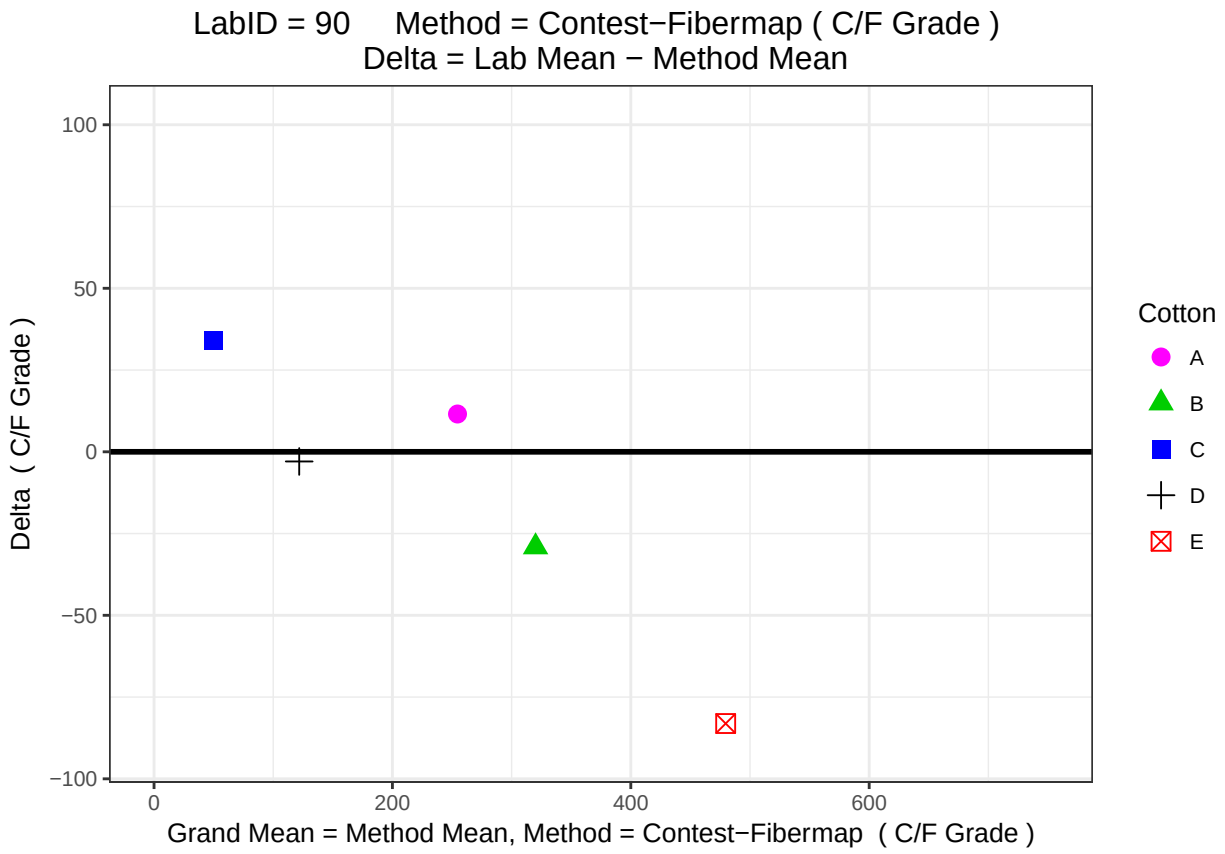


CSITC type chart for Method Contest-Fibermap

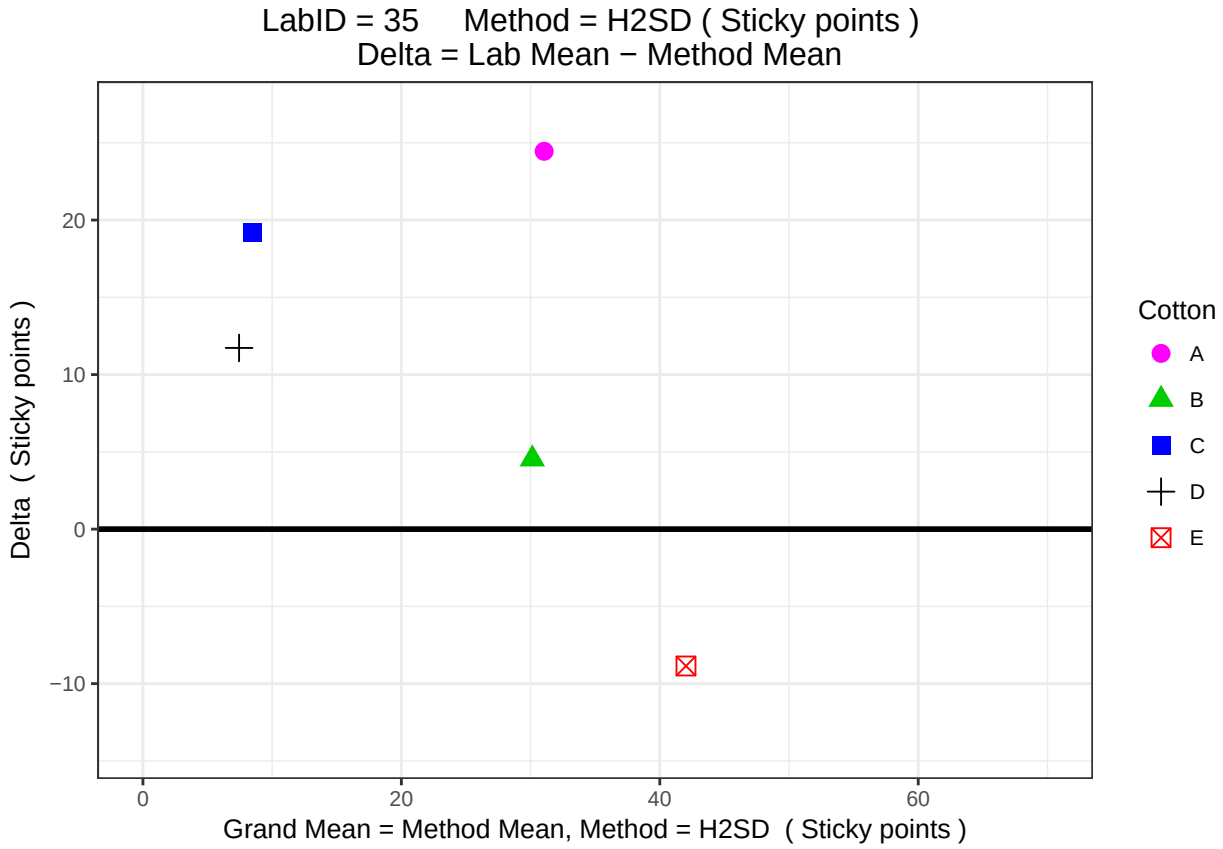


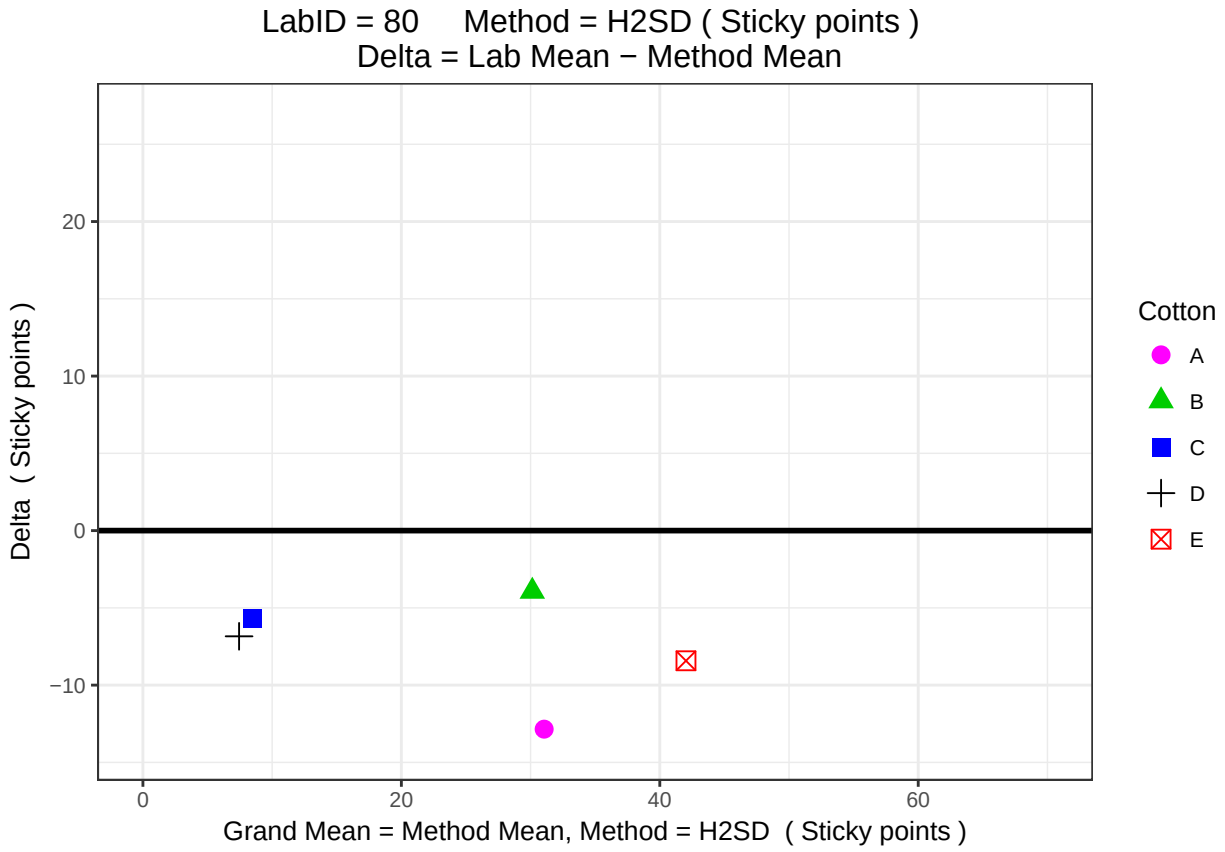

LabID = 75 Method = Contest−Fibermap (C/F Grade)
Delta = Lab Mean − Method Mean
Delta (C/F Grade)
100
50
0
−50
−100
0
200
400
600
Grand Mean = Method Mean, Method = Contest−Fibermap (C/F Grade)
Cotton
A
B
C
D
E

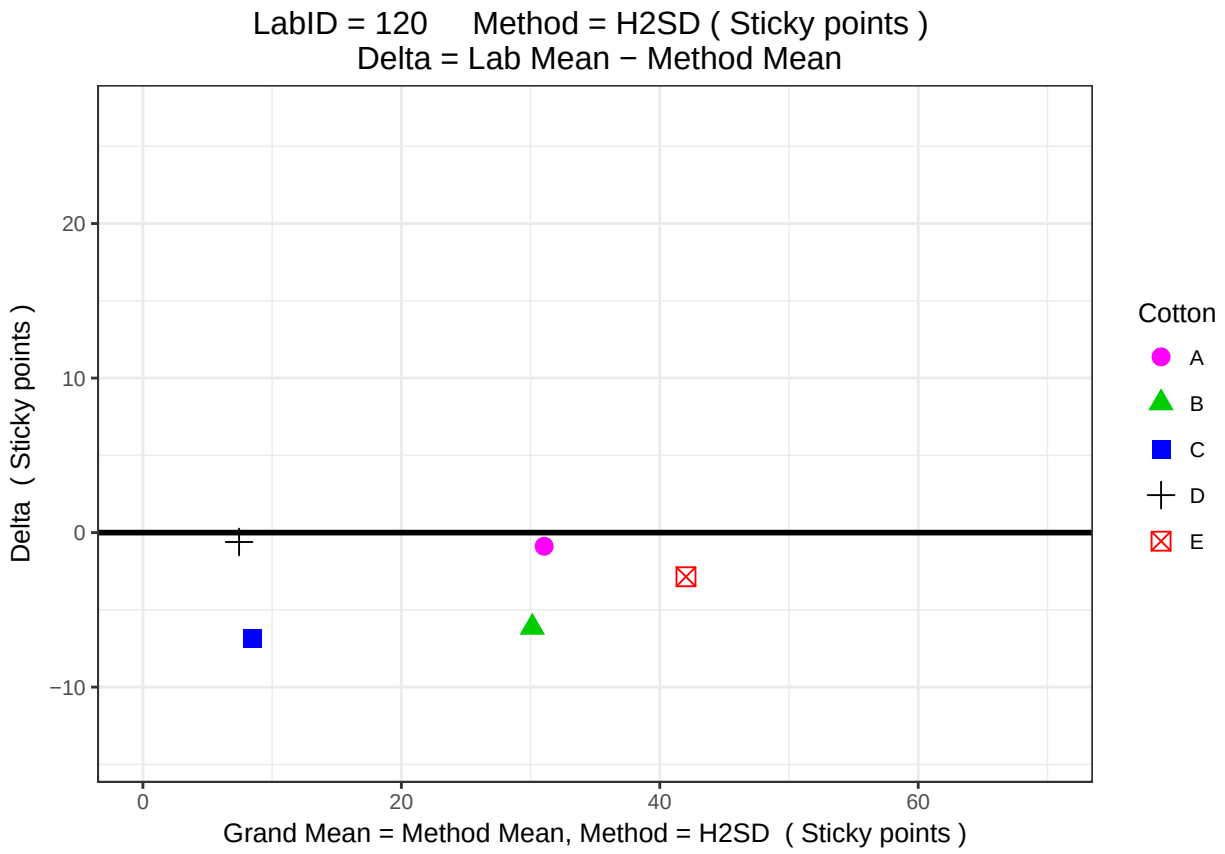

LabID = 85 Method = Contest−Fibermap (C/F Grade)
Delta = Lab Mean − Method Mean
Delta (C/F Grade)
100
50
0
−50
−100
0
200
400
600
Grand Mean = Method Mean, Method = Contest−Fibermap (C/F Grade)
Cotton
A
B
C
D
E

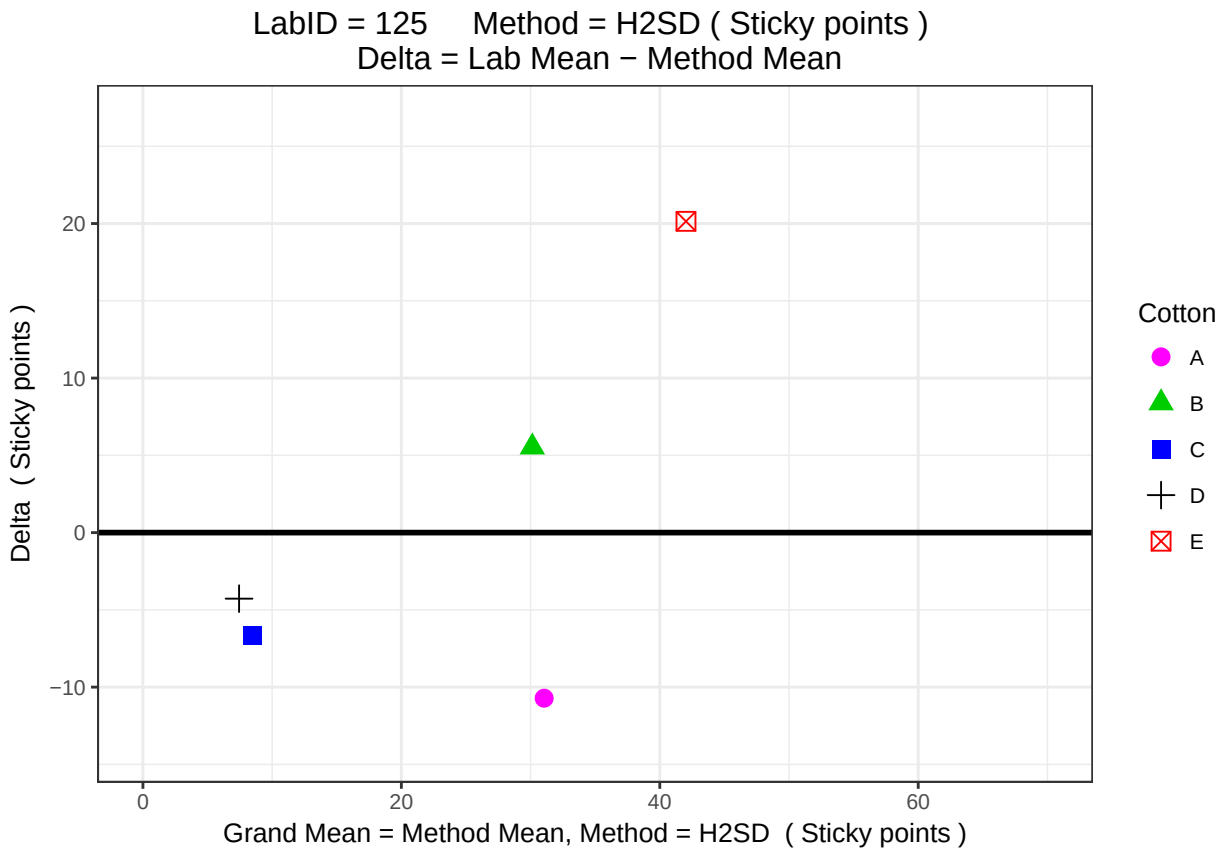

LabID = 90 Method = Contest−Fibermap (C/F Grade)
Delta = Lab Mean − Method Mean
Delta (C/F Grade)
100
50
0
−50
−100
0
200
400
600
Grand Mean = Method Mean, Method = Contest−Fibermap (C/F Grade)
Cotton
A
B
C
D
E

CSITC type chart for Method H2SD

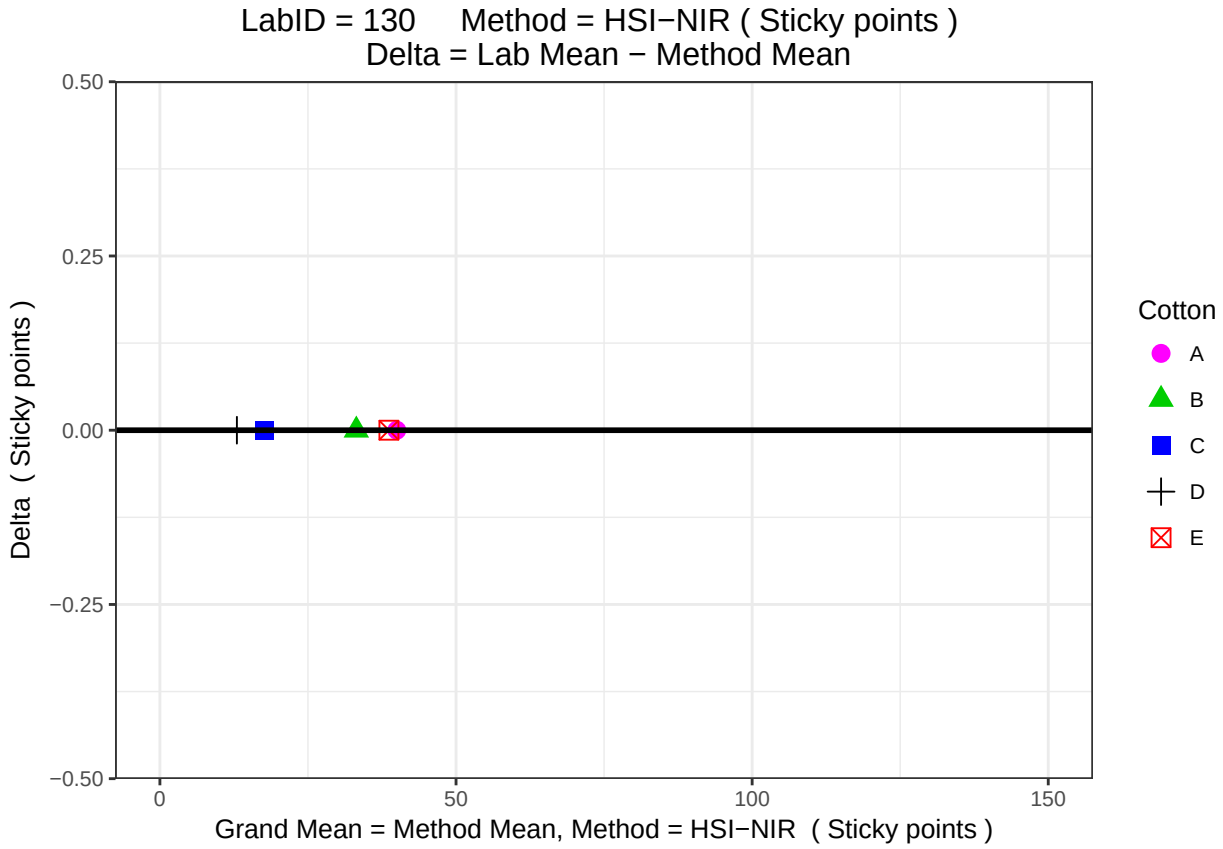



LabID = 80 Method = H2SD (Sticky points)
Delta = Lab Mean − Method Mean
Delta (Sticky points)
20
10
0
−10
0
20
40
60
Grand Mean = Method Mean, Method = H2SD (Sticky points)
Cotton
A
B
C
D
E

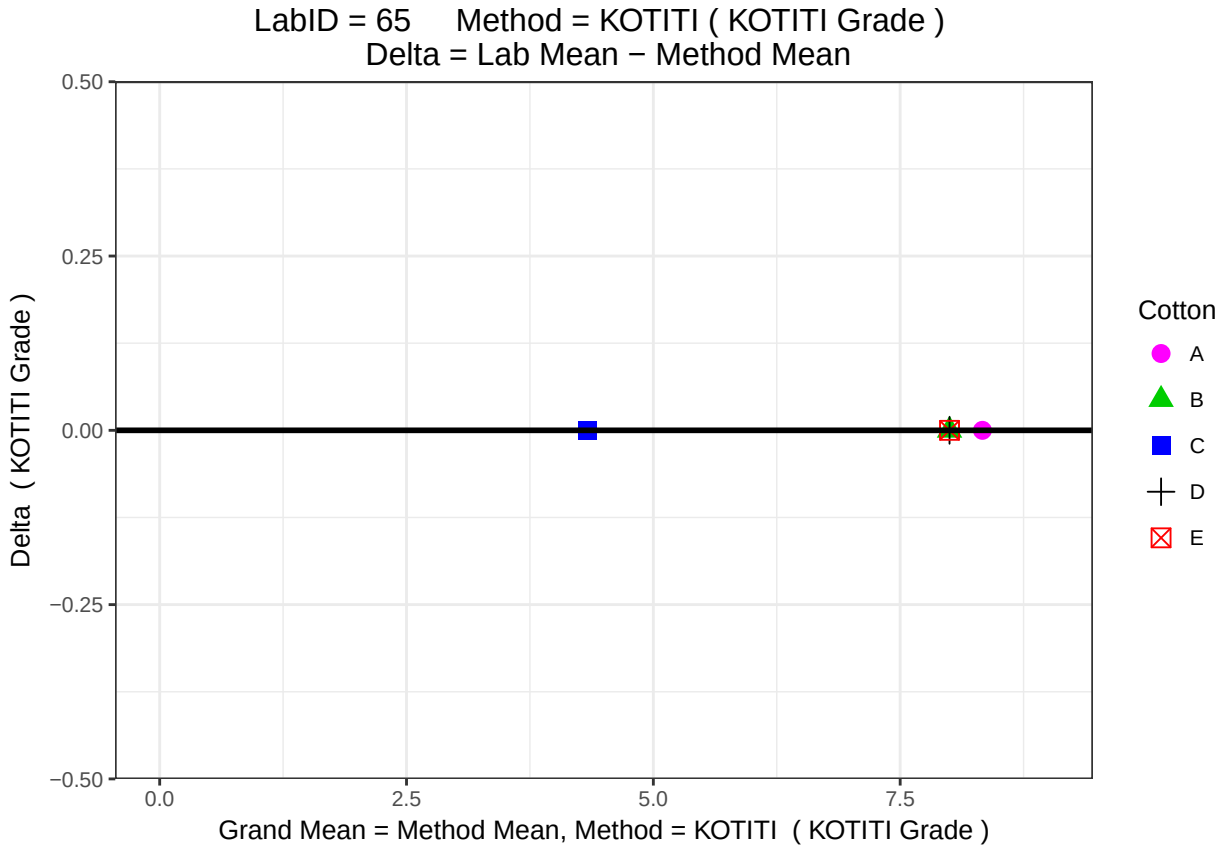

LabID = 120 Method = H2SD (Sticky points)
Delta = Lab Mean − Method Mean
Delta (Sticky points)
20
10
0
−10
0
20
40
60
Grand Mean = Method Mean, Method = H2SD (Sticky points)
Cotton
A
B
C
D
E


LabID = 125 Method = H2SD (Sticky points)
Delta = Lab Mean − Method Mean
Delta (Sticky points)
20
10
0
−10
0
20
40
60
Grand Mean = Method Mean, Method = H2SD (Sticky points)
Cotton
A
B
C
D
E

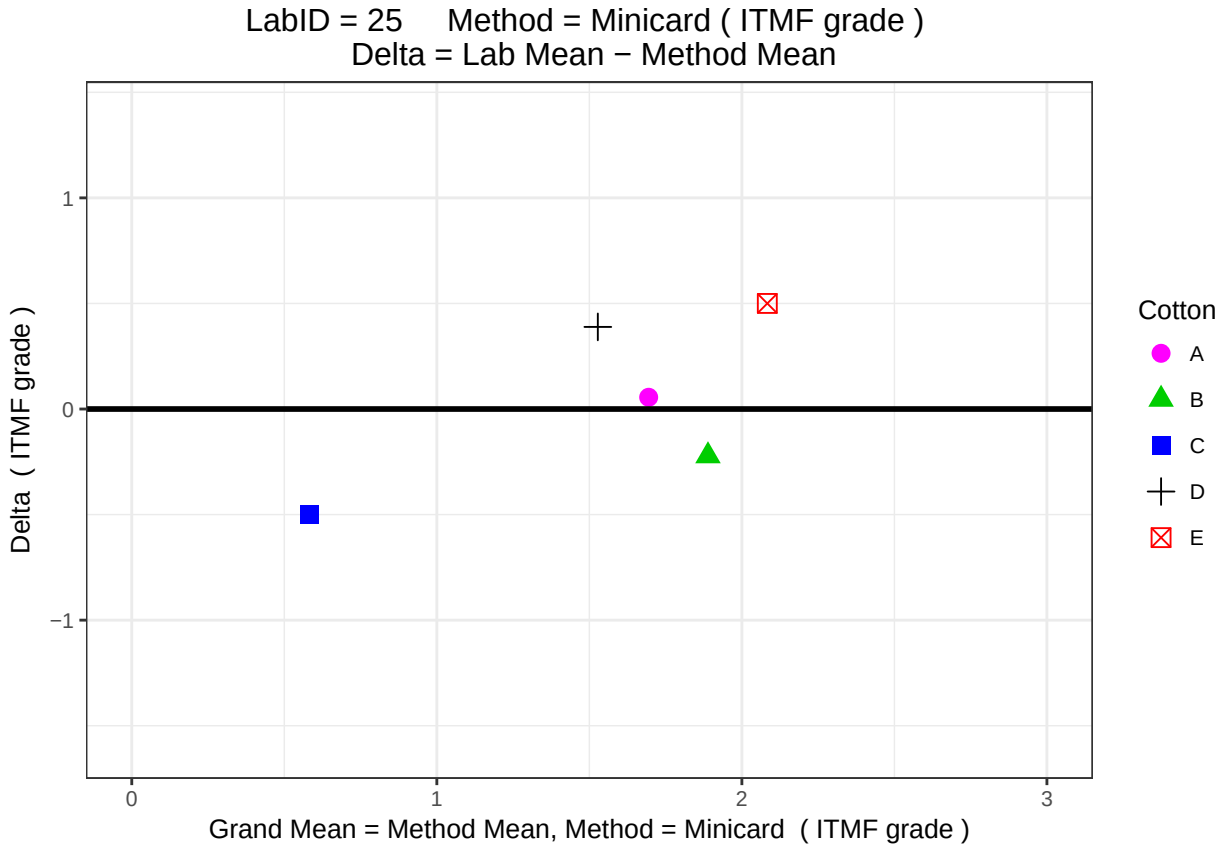
CSITC type chart for Method HSI-NIR

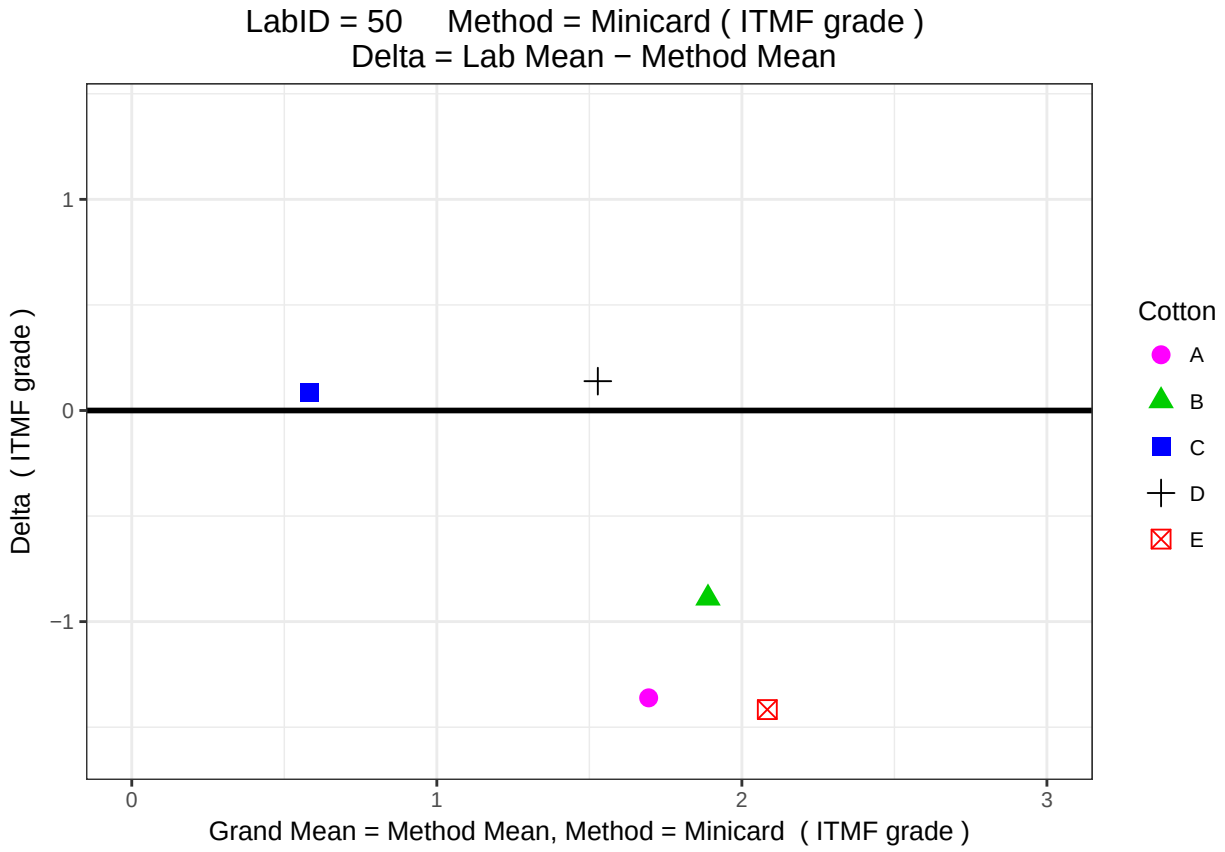


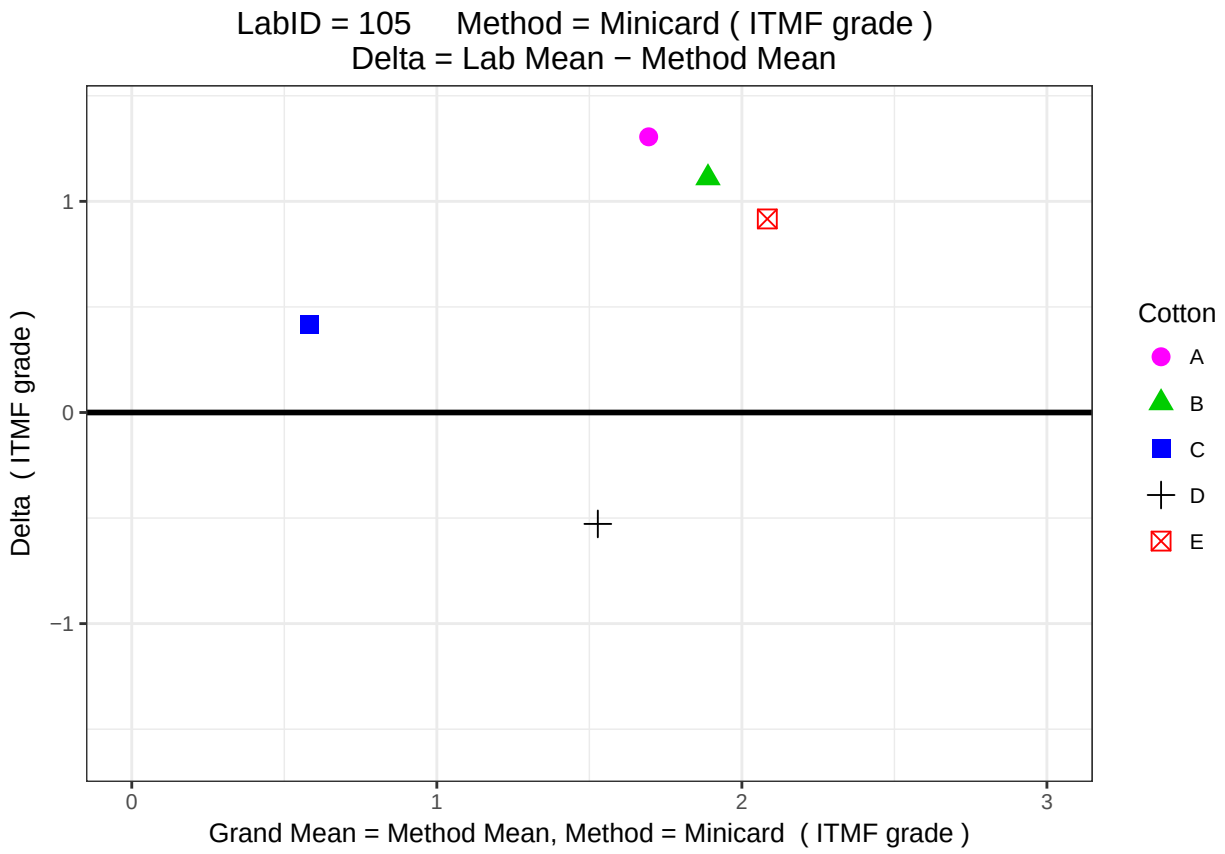
CSITC type chart for Method KOTITI



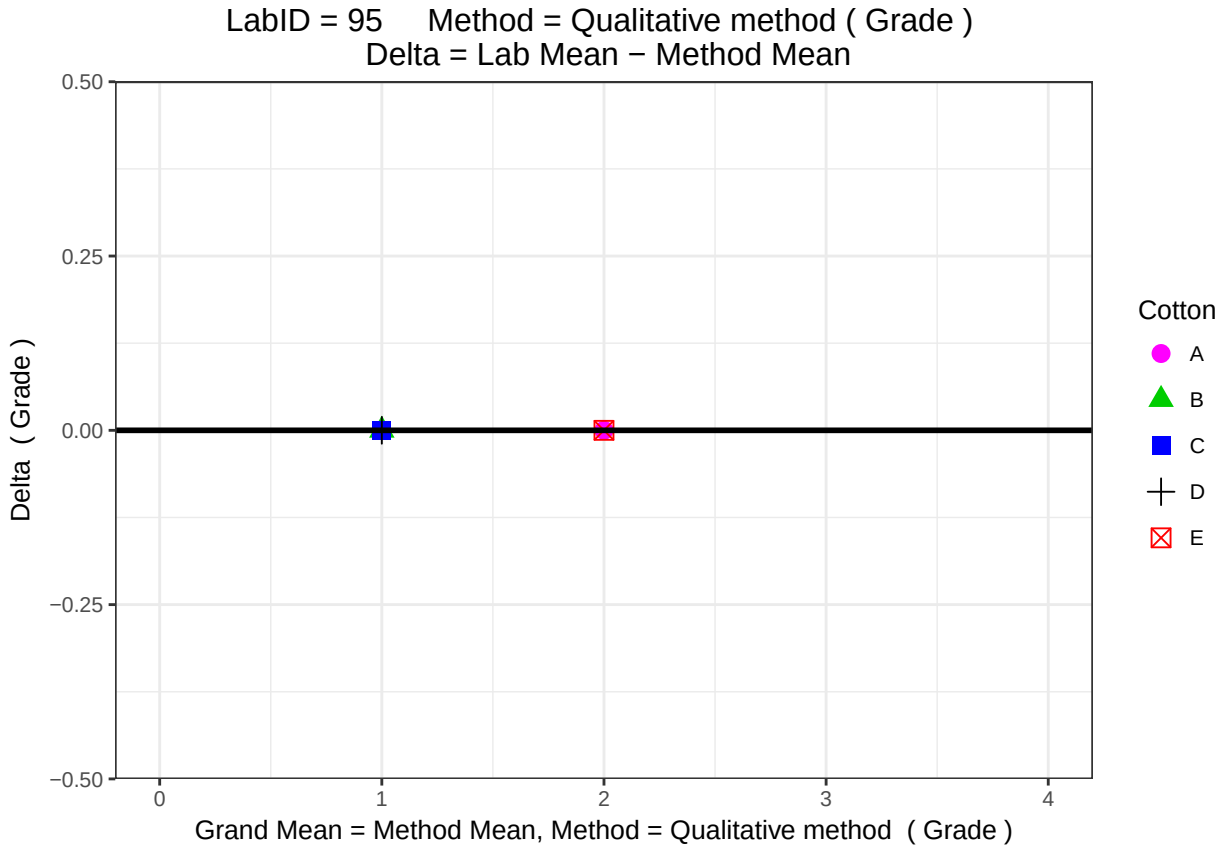
CSITC type chart for Method Minicard



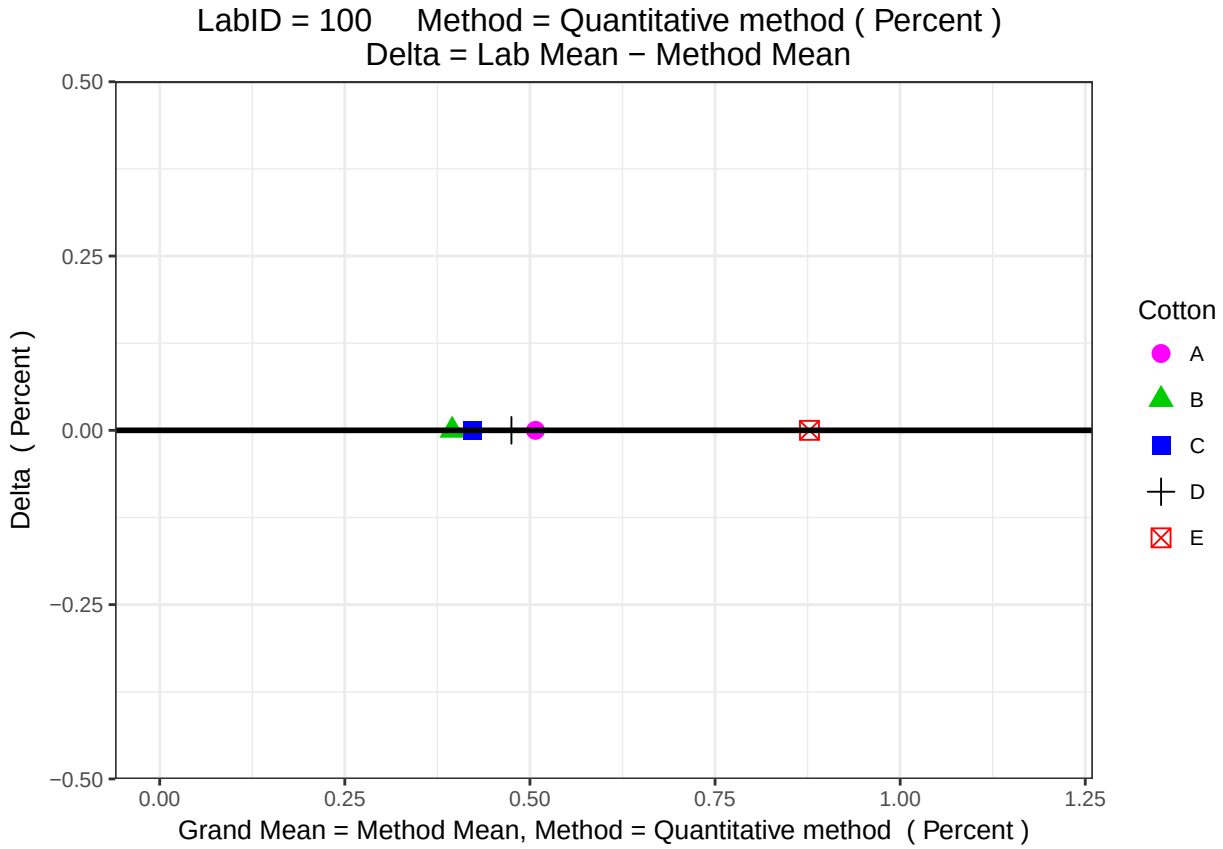

LabID = 50 Method = Minicard (ITMF grade)
Delta = Lab Mean − Method Mean
Delta (ITMF grade)
1
0
−1
0
1
2
3
Grand Mean = Method Mean, Method = Minicard (ITMF grade)
Cotton
A
B
C
D
E


LabID = 105 Method = Minicard (ITMF grade)
Delta = Lab Mean − Method Mean
Delta (ITMF grade)
1
0
−1
0
1
2
3
Grand Mean = Method Mean, Method = Minicard (ITMF grade)
Cotton
A
B
C
D
E

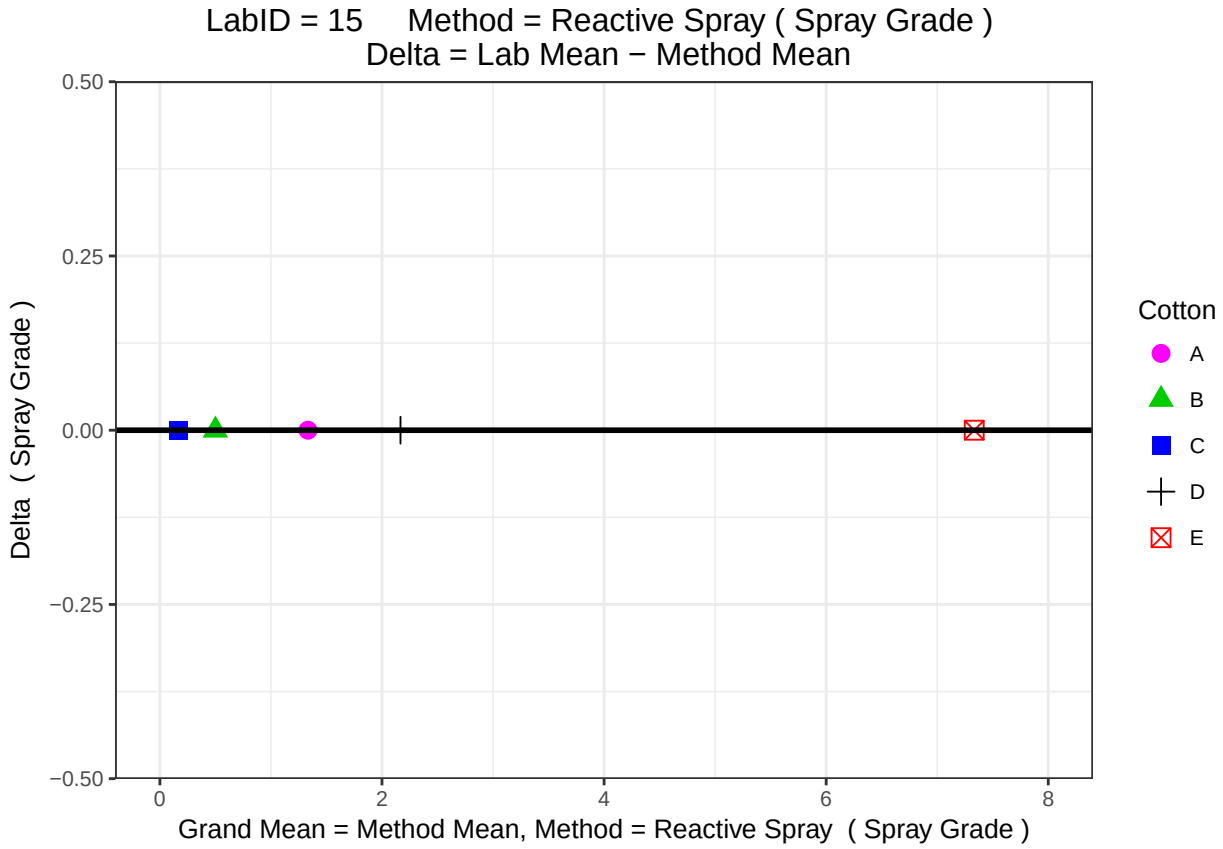
CSITC type chart for Method Qualitative method



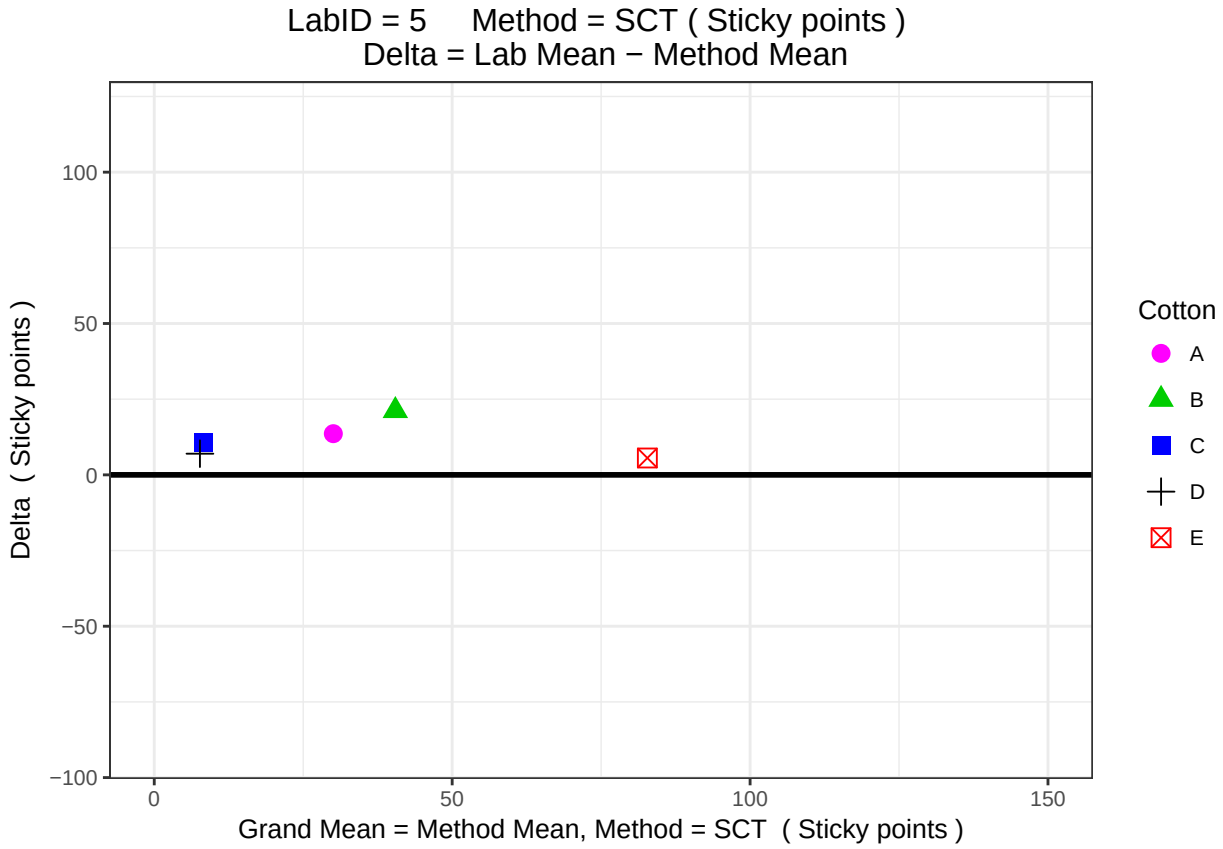
CSITC type chart for Method Quantitative method

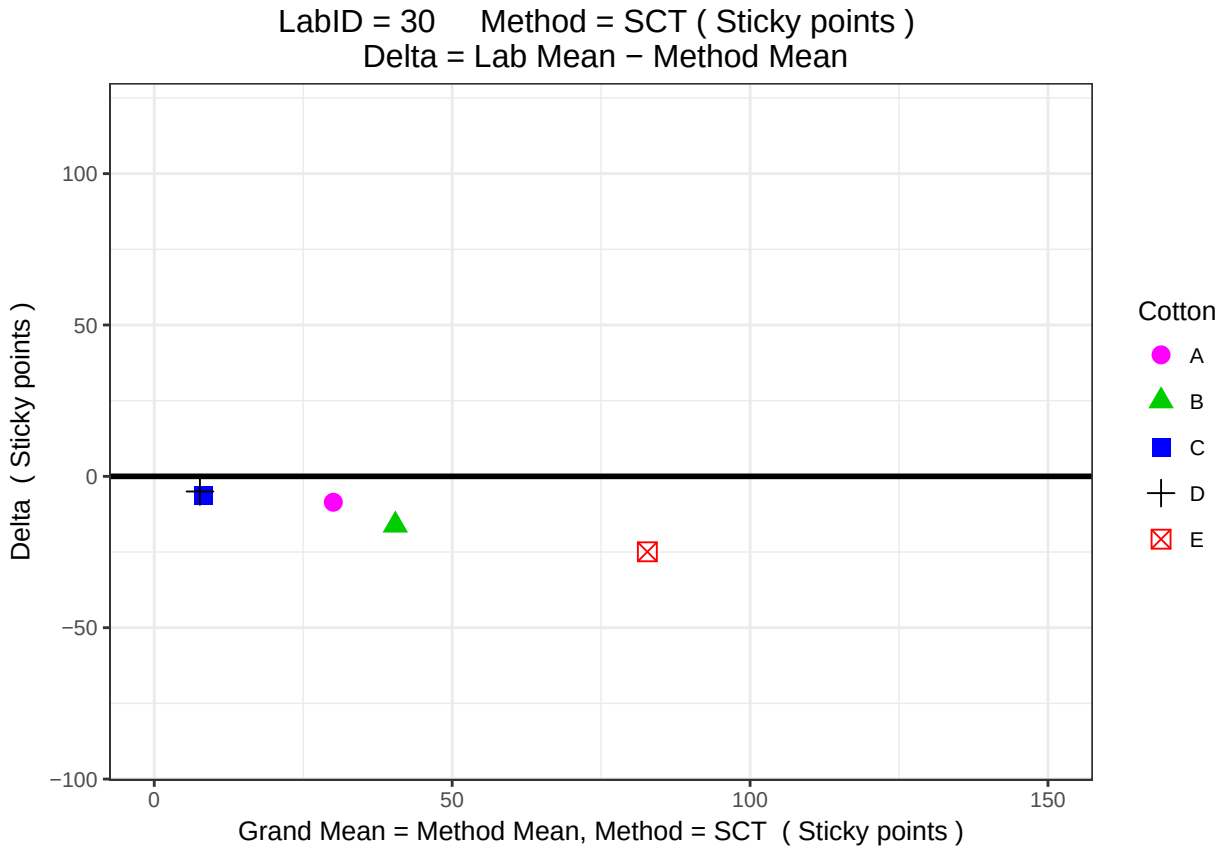


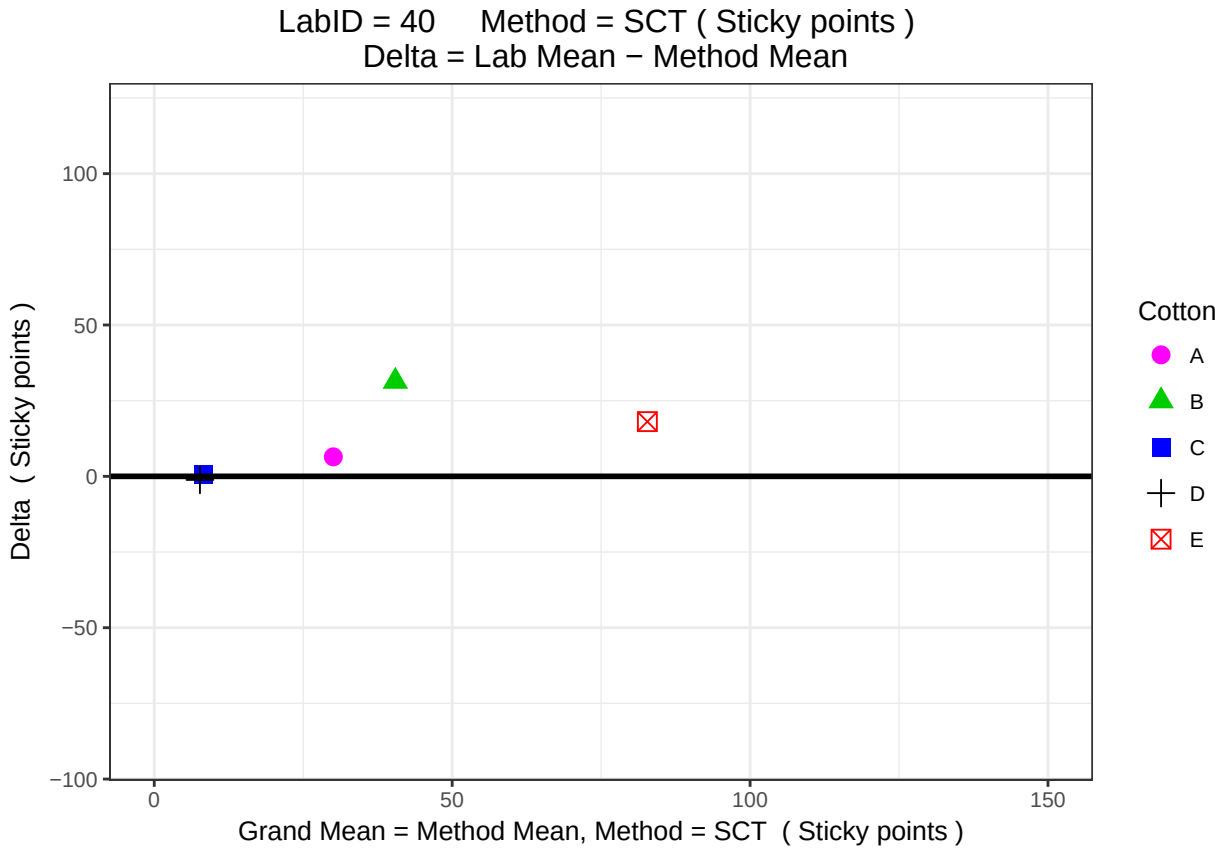
CSITC type chart for Method Reactive Spray

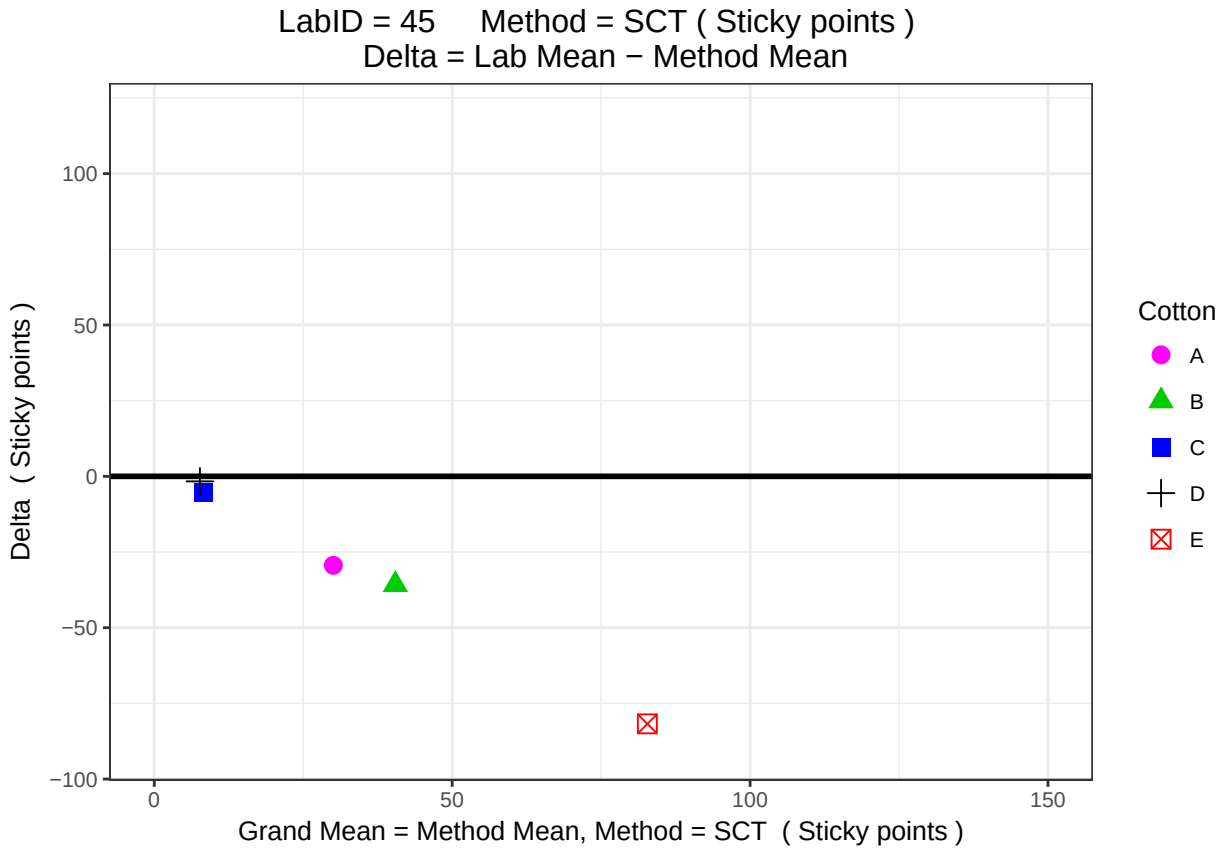


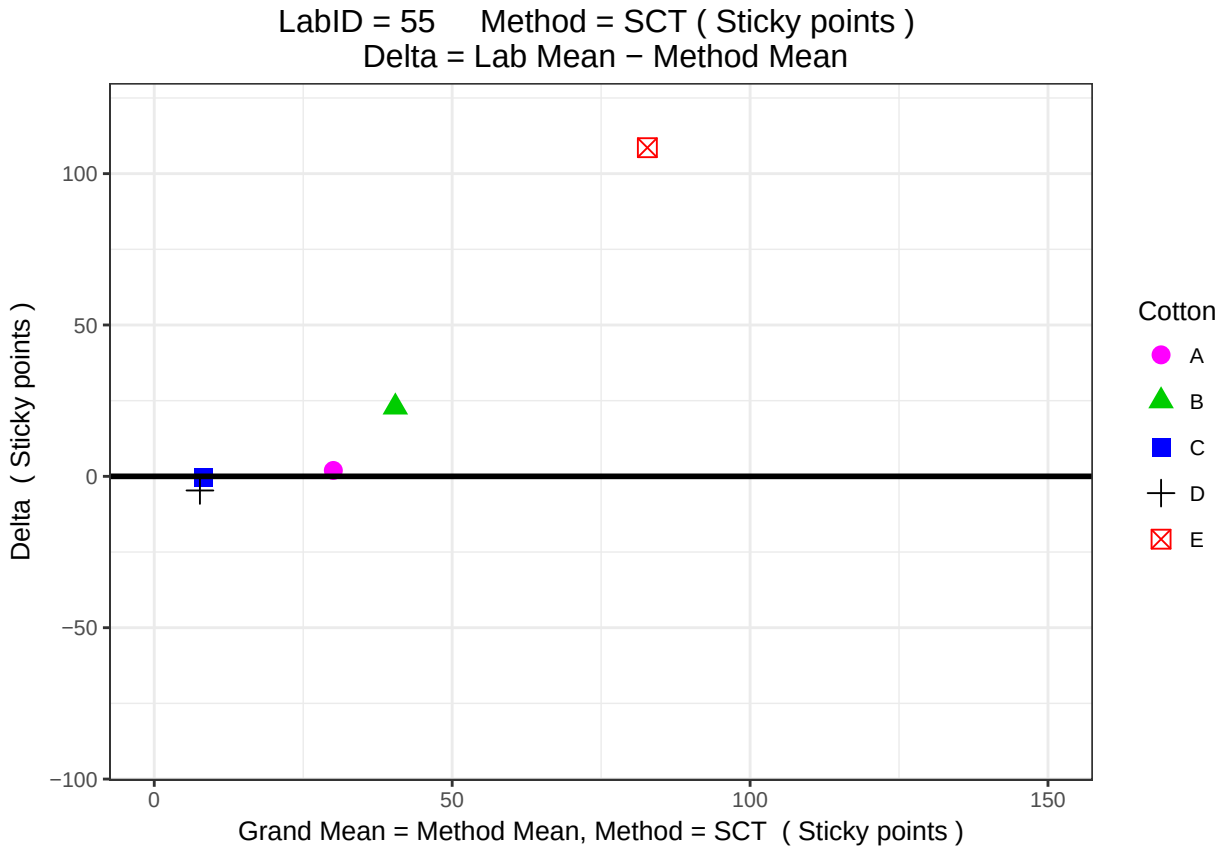
CSITC type chart for Method SCT

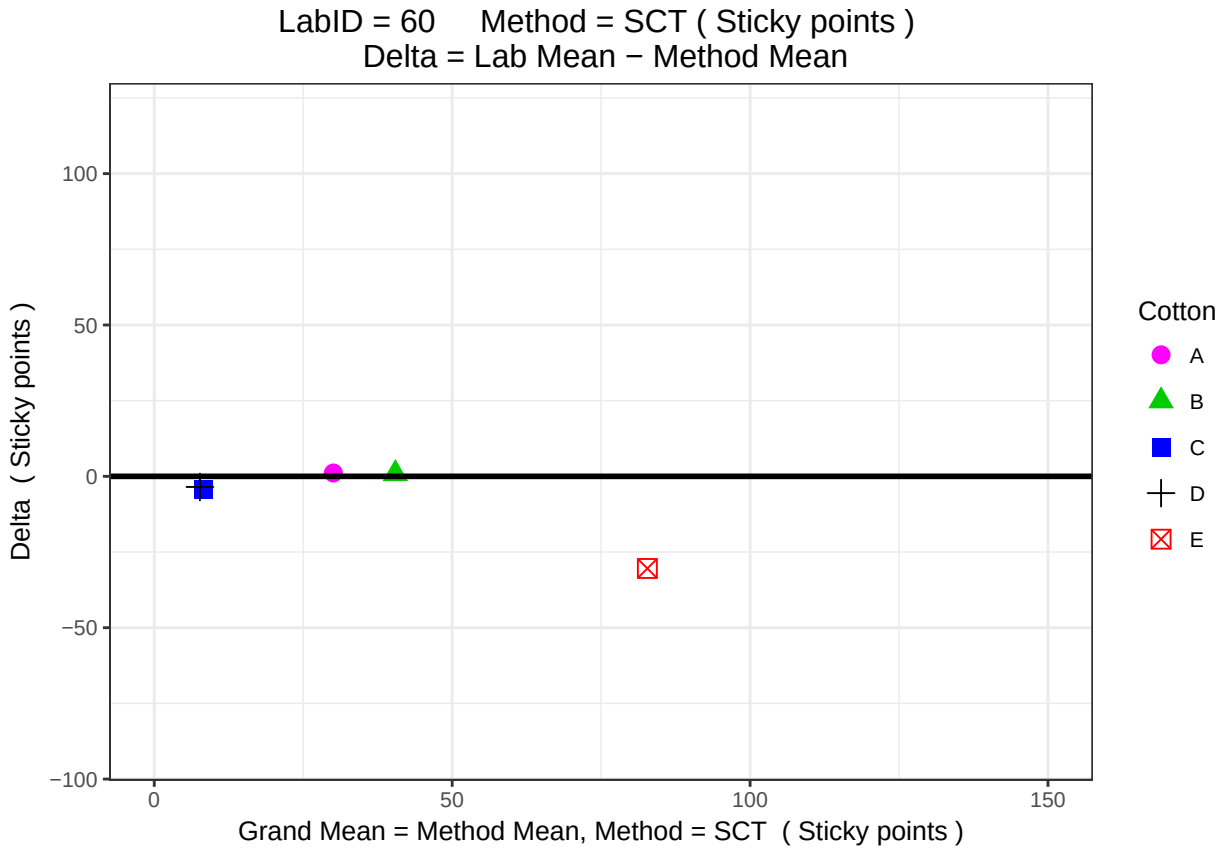


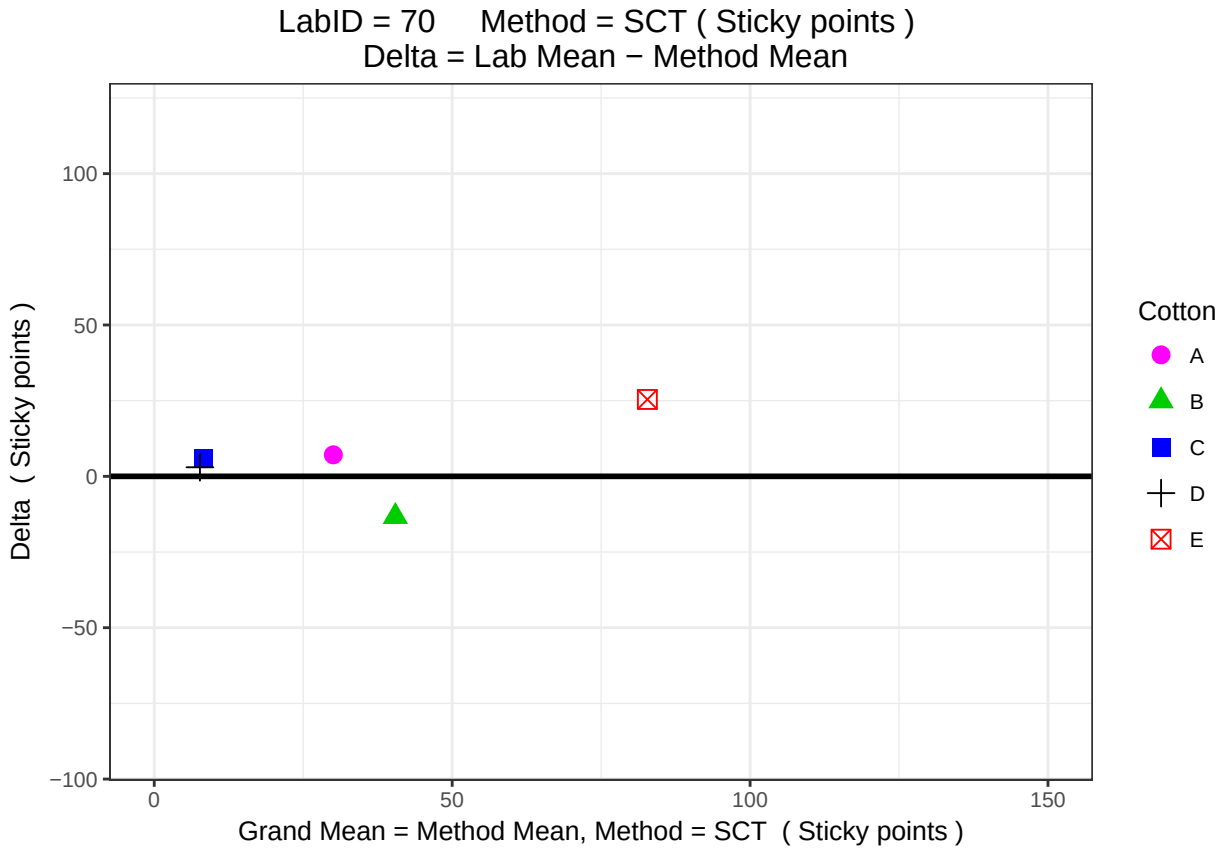

LabID = 30 Method = SCT (Sticky points)
Delta = Lab Mean − Method Mean
Delta (Sticky points)
100
50
0
−50
−100
0
50
100
150
Grand Mean = Method Mean, Method = SCT (Sticky points)
Cotton
A
B
C
D
E

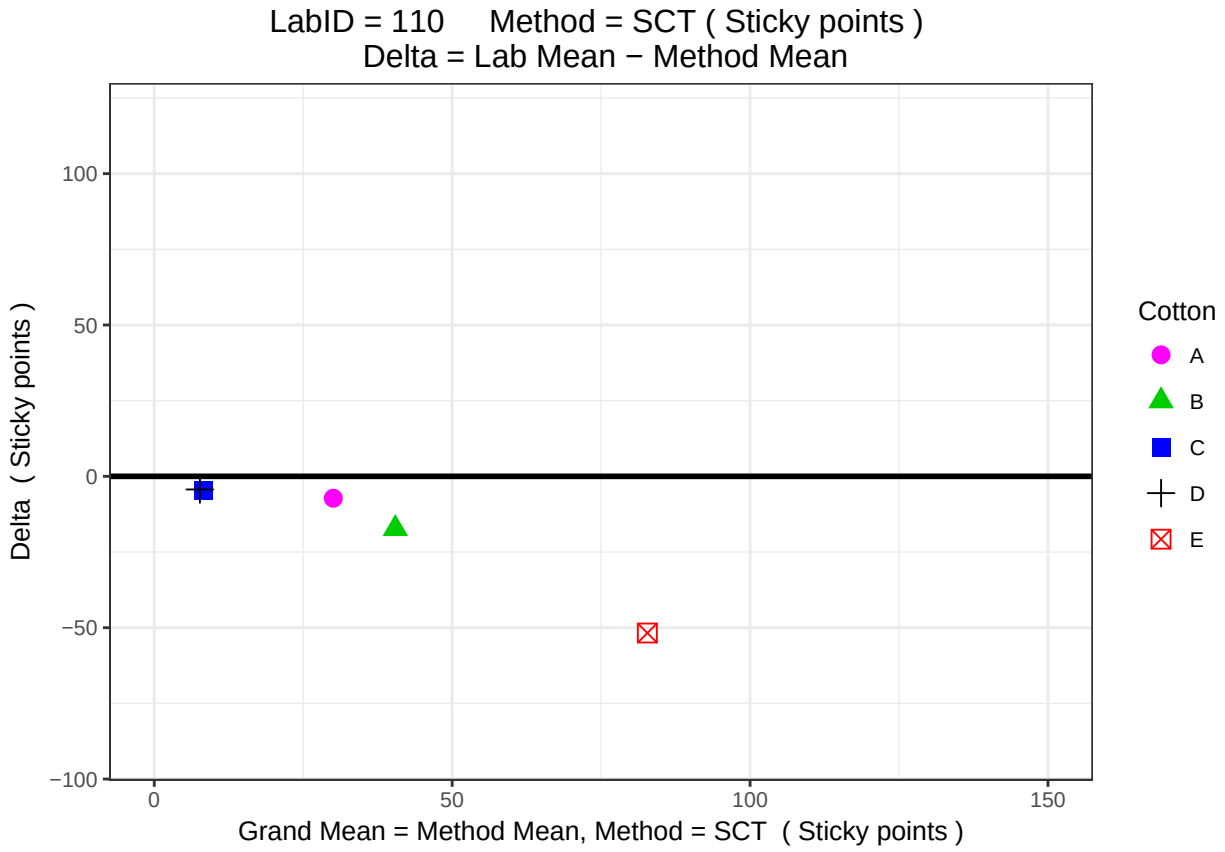

LabID = 40 Method = SCT (Sticky points)
Delta = Lab Mean − Method Mean
Delta (Sticky points)
100
50
0
−50
−100
0
50
100
150
Grand Mean = Method Mean, Method = SCT (Sticky points)
Cotton
A
B
C
D
E

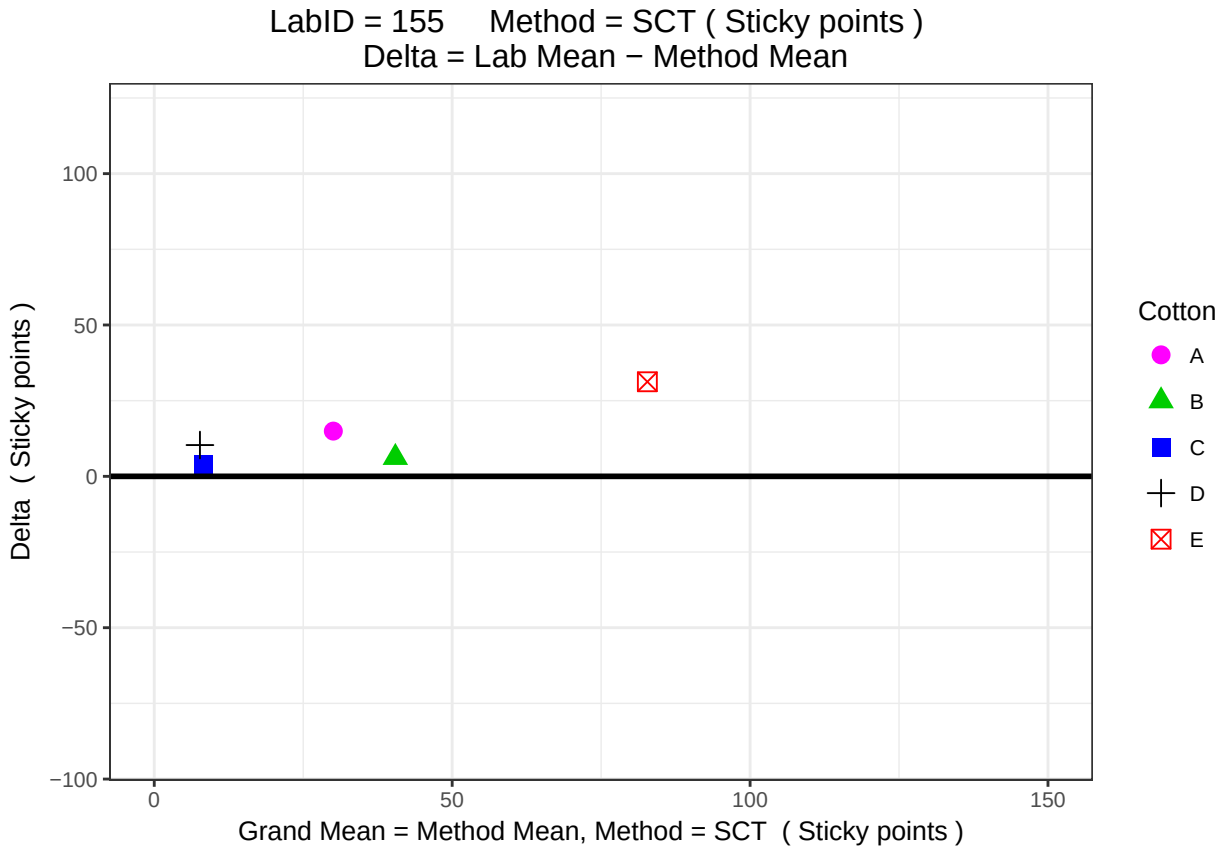

LabID = 45 Method = SCT (Sticky points)
Delta = Lab Mean − Method Mean
Delta (Sticky points)
100
50
0
−50
−100
0
50
100
150
Grand Mean = Method Mean, Method = SCT (Sticky points)
Cotton
A
B
C
D
E


LabID = 55 Method = SCT (Sticky points)
Delta = Lab Mean − Method Mean
Delta (Sticky points)
100
50
0
−50
−100
0
50
100
150
Grand Mean = Method Mean, Method = SCT (Sticky points)
Cotton
A
B
C
D
E


LabID = 60 Method = SCT (Sticky points)
Delta = Lab Mean − Method Mean
Delta (Sticky points)
100
50
0
−50
−100
0
50
100
150
Grand Mean = Method Mean, Method = SCT (Sticky points)
Cotton
A
B
C
D
E


LabID = 70 Method = SCT (Sticky points)
Delta = Lab Mean − Method Mean
Delta (Sticky points)
100
50
0
−50
−100
0
50
100
150
Grand Mean = Method Mean, Method = SCT (Sticky points)
Cotton
A
B
C
D
E


LabID = 110 Method = SCT (Sticky points)
Delta = Lab Mean − Method Mean
Delta (Sticky points)
100
50
0
−50
−100
0
50
100
150
Grand Mean = Method Mean, Method = SCT (Sticky points)
Cotton
A
B
C
D
E


LabID = 155 Method = SCT (Sticky points)
Delta = Lab Mean − Method Mean
Delta (Sticky points)
100
50
0
−50
−100
0
50
100
150
Grand Mean = Method Mean, Method = SCT (Sticky points)
Cotton
A
B
C
D
E

CommonScale [7]

Principle

In ITMF-ICCTM meeting organized in March 2018 in Bremen, it was envisaged to compare results from various stickiness methods to check how close are the gained results. A proposal using a pro-rata approach was made as one way to achieve this comparison. The following table gives the numeric values to which each and all results from this round-test were calculated whith the following formula: $CommonScale = \frac{LabID\ \ reading\ *\ 100}{MaxEver\ \ for\ \ this\ \ method}$, with MaxEver being the maximum value that any given method could read for the most sticky cotton ever. This will continue as long as necessary.

During this ITMF-ICCTM meeting in March 2018, it was also mentioned that MaxEver may not be the best way to base the provided calculations for COmmonScale. We then expect Participating Laboratories to propose an other calculation method(s), which then would be added to this report in the future.

Method	MaxEver	Unit
Caramelization	7.0	Color degree
Clinitest	7.0	Color chart
Contest-Fibermap	750.0	C/F Grade
H2SD	70.0	Sticky points
HSI-NIR	150.0	Sticky points
KOTITI	9.0	KOTITI Grade
Minicard	3.0	ITMF grade
Qualitative method	4.0	Grade
Quantitative method	1.2	Percent
Reactive Spray	8.0	Spray Grade
SCT	150.0	Sticky points

For instance,

- a reading of 2 at the minicard, with a MaxEver set at 3, will convert into a CommonScale reading of: $67 = \frac{2\ *\ 100}{3}$.
- a reading of 63 at the SCT, with a MaxEver set at 150, will convert into a CommonScale reading of: $42 = \frac{63\ *\ 100}{150}$.
- *etc.*

[7] Footnote

* In the following charts, ML stands for the code Method x LabID.
* In the following charts, LM stands for the code LabID x Method.
* NA excluded
* Black dashed line = Method MeanInterLab per cotton and per Method.
* Red + = Laboratory mean for the given method and for the given cotton.
* Black x = Laboratory or CommonScale reading or individual reading for the given method and for the given cotton.

Limitations of the CommonScale approach

This approach has potential limitations:

- The resolution of CommonScale results is not equivalent for methods having a discrete scale, especially when the number of levels is low (for instance, levels for minicard stickiness grading is limited to 4 [0, 1, 2 and 3]) letting the corresponding CommonScale only limited to 0, 33, 67 and 100 results. In the same time, other methods having counts expressed in sticky points on extended scales for instance have lot more possibilities, as well as method being able to measure according to a continuous scale.

- It **only is safe to compare methods that are measuring the same single phenomenon, stickiness, or phenomenons that are related to stickiness.** At this point in time, it is not given that all present methods are measuring 'stickiness' or criterion that are related to stickiness.

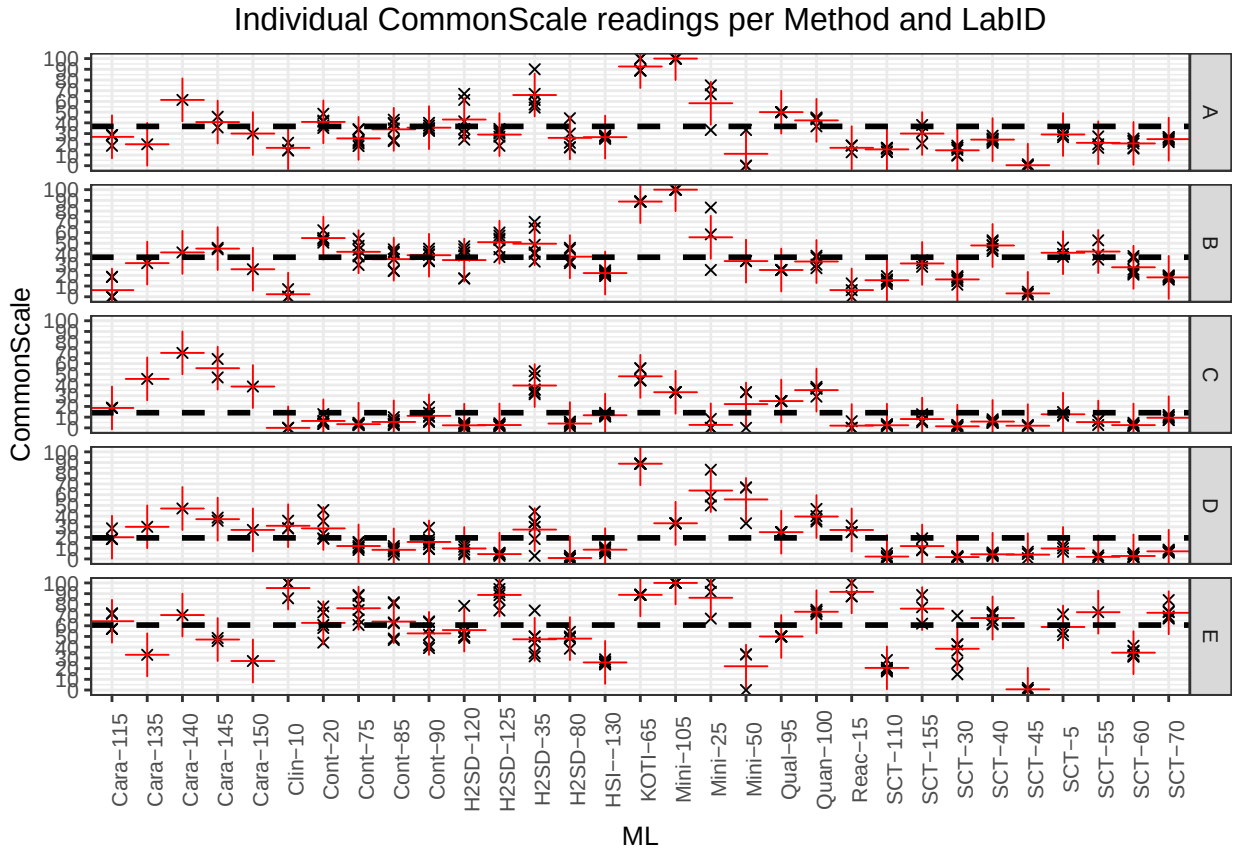
- This CommonScale approach provides results that still are cotton dependent.

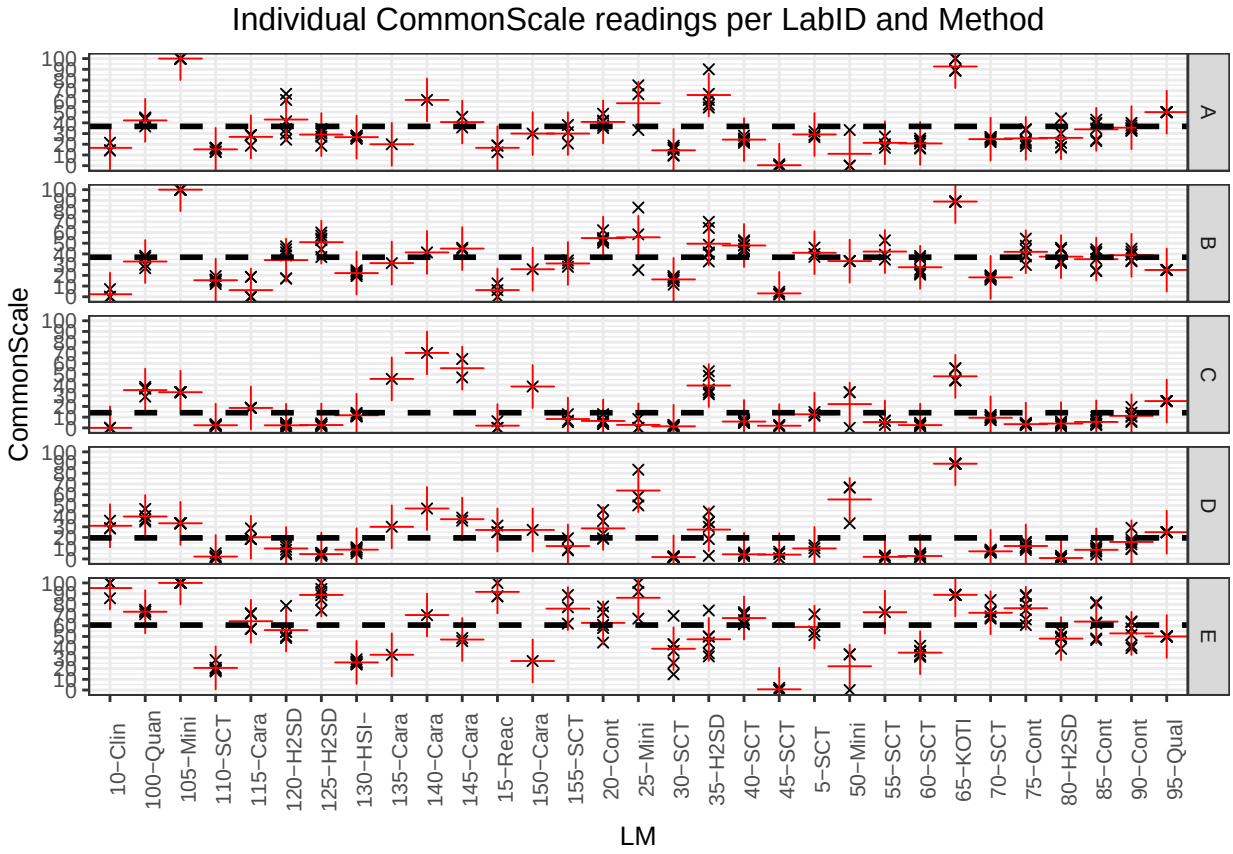
- This CommonScale approach may squeeze the scale for lower or highly stickiness contaminated cottons.

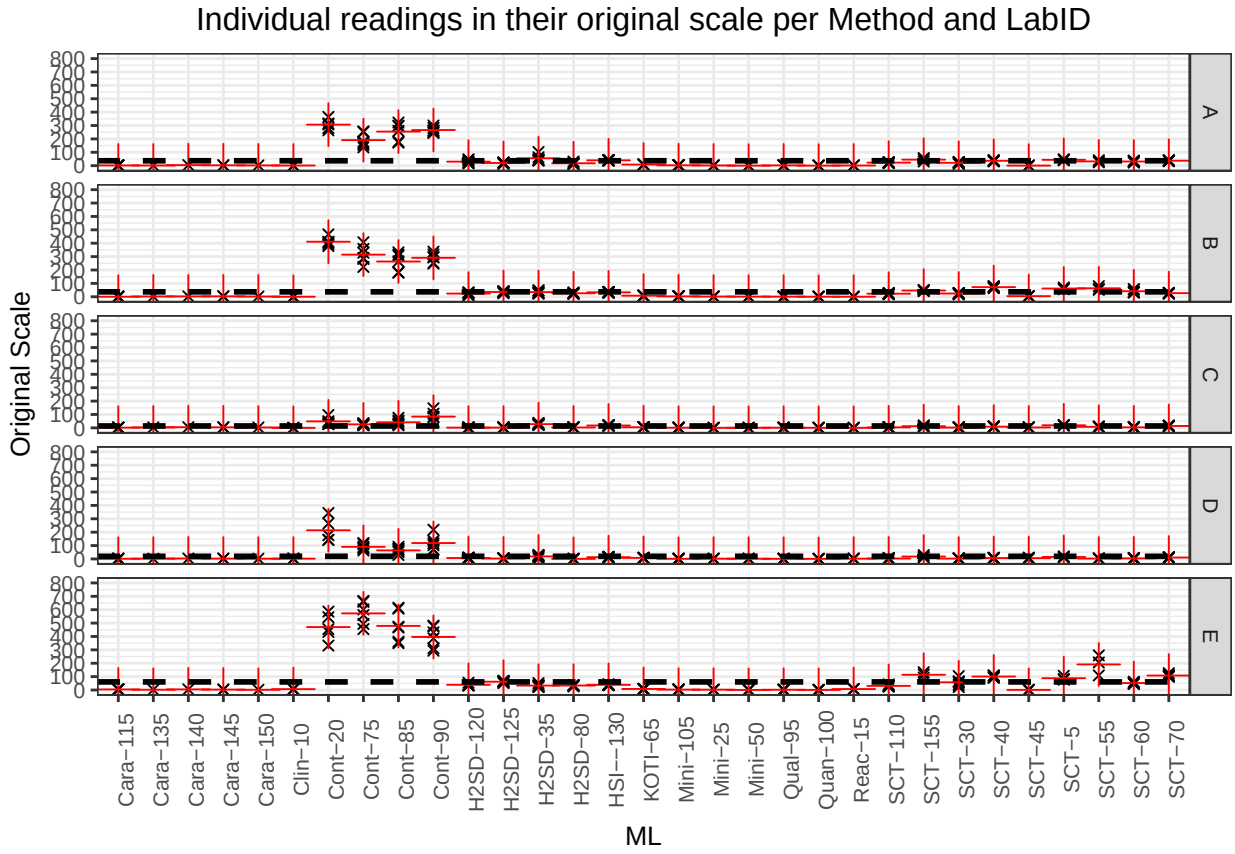
- This CommonScale approach may therefore have incidence on precision and accuracy of gained results.

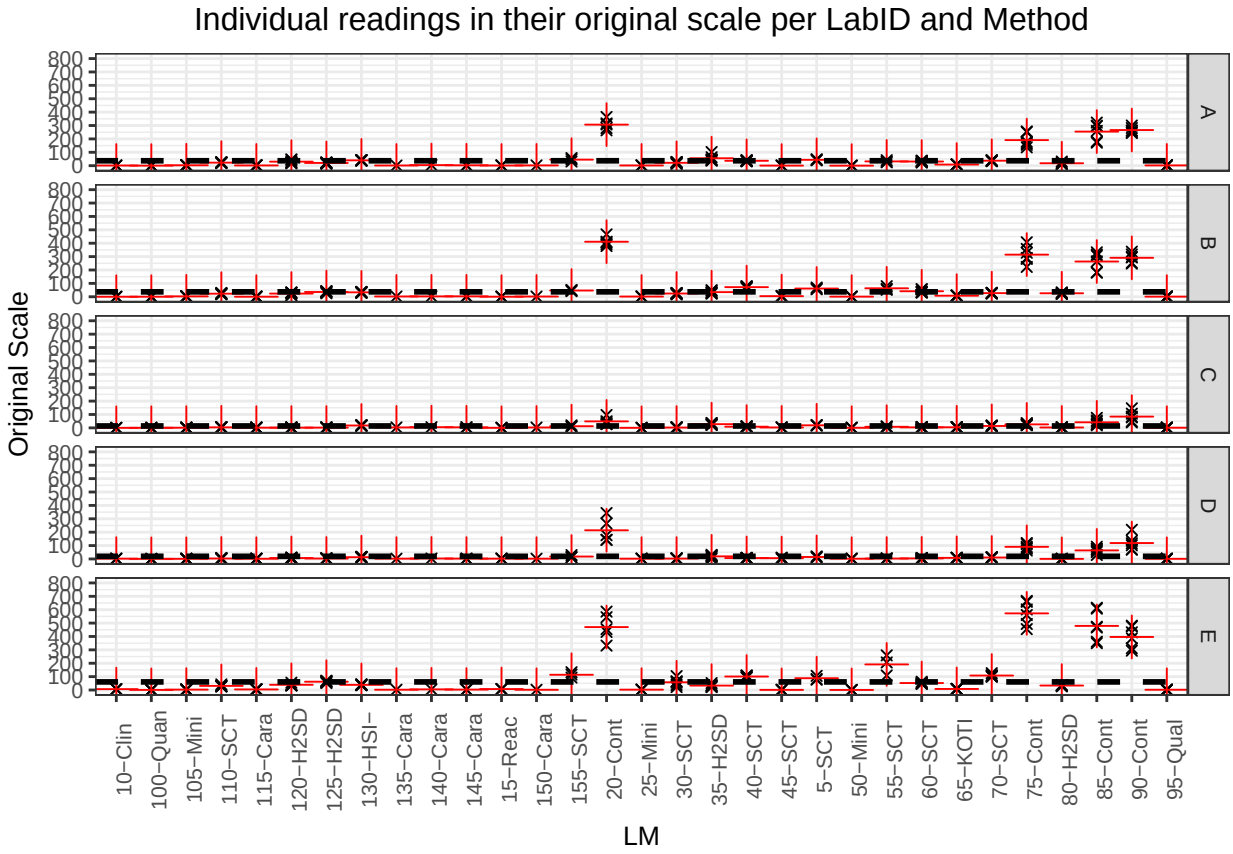
As a conclusion, as said earlier, CommonScale will be experimented at least for some round-tests in order to see if it could help Manufacturers and Users ***to get closer and closer results for each method for the same cottons over time.*** On the long run, the ability of each method to characterize stickiness ***in its strict sense*** will have to be evaluated to go further in the harmonization process; this could be by restricting some method(s) to be present in this round-test if they do not predict well enough stickiness troubles: a procedure has to be developed accordingly.

CommonScale charts


Individual CommonScale readings per Method and LabID
CommonScale
A
B
C
D
E
Cara−115
Cara−135
Cara−140
Cara−145
Cara−150
Clin−10
Cont−20
Cont−75
Cont−85
Cont−90
H2SD−120
H2SD−125
H2SD−35
H2SD−80
HSI−−130
KOTI−65
Mini−105
Mini−25
Mini−50
Qual−95
Quan−100
Reac−15
SCT−110
SCT−155
SCT−30
SCT−40
SCT−45
SCT−5
SCT−55
SCT−60
SCT−70
ML


Individual CommonScale readings per LabID and Method
CommonScale
LM
A
B
C
D
E
10−Clin
100−Quan
105−Mini
110−SCT
115−Cara
120−H2SD
125−H2SD
130−HSI−
135−Cara
140−Cara
145−Cara
15−Reac
150−Cara
155−SCT
20−Cont
25−Mini
30−SCT
35−H2SD
40−SCT
45−SCT
5−SCT
50−Mini
55−SCT
60−SCT
65−KOTI
70−SCT
75−Cont
80−H2SD
85−Cont
90−Cont
95−Qual


Individual readings in their original scale per Method and LabID
Original Scale
ML
A
B
C
D
E
Cara−115
Cara−135
Cara−140
Cara−145
Cara−150
Clin−10
Cont−20
Cont−75
Cont−85
Cont−90
H2SD−120
H2SD−125
H2SD−35
H2SD−80
HSI−−130
KOTI−65
Mini−105
Mini−25
Mini−50
Qual−95
Quan−100
Reac−15
SCT−110
SCT−155
SCT−30
SCT−40
SCT−45
SCT−5
SCT−55
SCT−60
SCT−70


Individual readings in their original scale per LabID and Method
Original Scale
LM
A
B
C
D
E
10−Clin
100−Quan
105−Mini
110−SCT
115−Cara
120−H2SD
125−H2SD
130−HSI−
135−Cara
140−Cara
145−Cara
15−Reac
150−Cara
155−SCT
20−Cont
25−Mini
30−SCT
35−H2SD
40−SCT
45−SCT
5−SCT
50−Mini
55−SCT
60−SCT
65−KOTl
70−SCT
75−Cont
80−H2SD
85−Cont
90−Cont
95−Qual

Overall statistics per Cotton and Method [8]

The following tables provide information about observed variations between results of various instruments within each method, for each of all used methods and for each and all cottons used in this round-test.

- Comparing the CVs between the lines of these tables - meaning comparing methods for each cotton - is not helpfull at all, as units used are very different between methods (so different that it has been necessary to create the CommonScale approach just displayed above to get a way of comparing results).

- However seing the evolution of these CV values over time, Method by Method, will inform about the degree of harmonization achieved for stickiness measurement. A decrease of the CV values between instruments for each Method - which is expected over time - will give indications about the degree of care taken by Laboratories and Manufacturers to harmonize results over time for their respective methods.

[8] Footnote

* NA or NaN excluded from the orginal raw data * NA appears in the following tables when less that two laboratories provided data for the given cotton and method

* Mean and Standard Deviation expressed in Unit, CV expressed in %

Mean, standard deviation and CV between instruments by method, Cotton A

Method	MeanInterLab	SdInterLab	CVInterLab	Unit
Caramelization	2.5	1.1	45.1	Color degree
Clinitest	1.2	NA	NA	Color chart
Contest-Fibermap	254.6	47.9	18.8	C/F Grade
H2SD	31.1	17.1	55.1	Sticky points
HSI-NIR	40.0	NA	NA	Sticky points
KOTITI	8.3	NA	NA	KOTITI Grade
Minicard	1.7	1.3	78.7	ITMF grade
Qualitative method	2.0	NA	NA	Grade
Quantitative method	0.5	NA	NA	Percent
Reactive Spray	1.3	NA	NA	Spray Grade
SCT	30.1	13.7	45.5	Sticky points

Mean, standard deviation and CV between instruments by method, Cotton B

Method	MeanInterLab	SdInterLab	CVInterLab	Unit
Caramelization	2.1	1.1	51.3	Color degree
Clinitest	0.2	NA	NA	Color chart
Contest-Fibermap	320.1	64.3	20.1	C/F Grade
H2SD	30.1	5.9	19.6	Sticky points
HSI-NIR	33.2	NA	NA	Sticky points
KOTITI	8.0	NA	NA	KOTITI Grade
Minicard	1.9	1.0	53.9	ITMF grade
Qualitative method	1.0	NA	NA	Grade
Quantitative method	0.4	NA	NA	Percent
Reactive Spray	0.5	NA	NA	Spray Grade
SCT	40.5	22.4	55.4	Sticky points

Mean, standard deviation and CV between instruments by method, Cotton C

Method	MeanInterLab	SdInterLab	CVInterLab	Unit
Caramelization	3.2	1.3	42.0	Color degree
Clinitest	0.0	NA	NA	Color chart
Contest-Fibermap	50.0	24.5	49.1	C/F Grade
H2SD	8.5	12.8	150.7	Sticky points
HSI-NIR	17.7	NA	NA	Sticky points
KOTITI	4.3	NA	NA	KOTITI Grade
Minicard	0.6	0.5	79.5	ITMF grade
Qualitative method	1.0	NA	NA	Grade
Quantitative method	0.4	NA	NA	Percent
Reactive Spray	0.2	NA	NA	Spray Grade
SCT	8.3	5.8	70.1	Sticky points

Mean, standard deviation and CV between instruments by method, Cotton D

Method	MeanInterLab	SdInterLab	CVInterLab	Unit
Caramelization	2.3	0.7	31.7	Color degree
Clinitest	2.2	NA	NA	Color chart
Contest-Fibermap	121.8	65.4	53.7	C/F Grade
H2SD	7.4	8.2	110.5	Sticky points
HSI-NIR	13.0	NA	NA	Sticky points
KOTITI	8.0	NA	NA	KOTITI Grade
Minicard	1.5	0.5	31.0	ITMF grade
Qualitative method	1.0	NA	NA	Grade
Quantitative method	0.5	NA	NA	Percent
Reactive Spray	2.2	NA	NA	Spray Grade
SCT	7.7	5.6	72.4	Sticky points

Mean, standard deviation and CV between instruments by method, Cotton E

Method	MeanInterLab	SdInterLab	CVInterLab	Unit
Caramelization	3.4	1.3	38.9	Color degree
Clinitest	6.7	NA	NA	Color chart
Contest-Fibermap	479.6	72.2	15.1	C/F Grade
H2SD	42.0	13.7	32.6	Sticky points
HSI-NIR	38.7	NA	NA	Sticky points
KOTITI	8.0	NA	NA	KOTITI Grade
Minicard	2.1	1.2	59.7	ITMF grade
Qualitative method	2.0	NA	NA	Grade
Quantitative method	0.9	NA	NA	Percent
Reactive Spray	7.3	NA	NA	Spray Grade
SCT	82.8	55.5	67.1	Sticky points

Frequently asked questions (Q) and answers (A) [9]

Q: Correlation matrix are sometimes difficult to read due to formatting; is there any improvement possible?
A: We search for a solution, probably for next RT. Sorry for the inconvenience in the meantime.

Q: For SCT, do we have to report the number of sticky points adhering to the top and the one adhering to the bottom aluminum foils in each cell of the provided Excel sheet, or do we have to report their sum?
A: _ For SCT, please only report the sum of the counts observed on the top and bottom foils _ in each cell of the Excel sheet; thanks.

Q: Why are the cells of the Excel form locked?
A: The cells are locked to avoid modifications in the template to enable our importing system 'to know' where to get each piece of information for placing and pasting it into a devoted cell in the data base system. This saves time and secures the data in its original state (avoiding typing mistakes). So please _ make sure to use the proper Excel template: use the latest form that was sent together with the announcement of samples dispatch for sending back you results. _

Q: What 'GB/T13785-1992' stands for?
A: GB/T13785-1992 stands for a Chinese standards called 'Test method for degree of sugar contains in cotton fibers – Colorimetry'.

Q: What 'H2SD' stands for?
A: H2SD stands for High Speed Stickiness Detector.

Q: What 'HSI-NIR' stands for?
A: HSI-NIR stands for Hyper Spectral Imaging based on Near Infra-red spectra.

Q: What 'SCT' stands for?
A: SCT stands for Stickiness Cotton Thermodetector.

Q: What 'TDM-A' stands for?
A: TDM-A stands for Thermo Detection Method, and A stands for a specific scale for designing the stickiness level.

To be complemented on demand.

[9] Footnote

* Based on all round-tests carried out already.

Software components to realize this report [10]

Software code version: June 28, 2019 by Jean-Paul Gourlot

R version 3.4.3 (2017-11-30) Platform: x86_64-w64-mingw32/x64 (64-bit) Running under: Windows 7 x64 (build 7601) Service Pack 1

Matrix products: default

locale: [1] LC_COLLATE=French_France.1252 LC_CTYPE=French_France.1252
[3] LC_MONETARY=French_France.1252 LC_NUMERIC=C
[5] LC_TIME=French_France.1252

attached base packages: [1] grid stats graphics grDevices utils datasets methods
[8] base

other attached packages: [1] rmarkdown_1.8 markdown_0.8 ggplot2_2.2.1 reshape2_1.4.3 [5] xlsx_0.5.7 xlsxjars_0.6.1 rJava_0.9-9 knitr_1.18
[9] readxl_1.0.0

loaded via a namespace (and not attached): [1] Rcpp_0.12.12 magrittr_1.5 munsell_0.4.3 colorspace_1.3-2
[5] rlang_0.1.2 rematch_1.0.1 highr_0.6 stringr_1.2.0
[9] plyr_1.8.4 tools_3.4.3 gtable_0.2.0 htmltools_0.3.6 [13] rprojroot_1.2 yaml_2.1.14 lazyeval_0.2.0 digest_0.6.12
[17] tibble_1.3.4 evaluate_0.10.1 labeling_0.3 stringi_1.1.5
[21] compiler_3.4.3 cellranger_1.1.0 backports_1.1.1 scales_0.5.0

[10] Footnote
* List of all R components for processing the data

[1] “ICCTM-ITMF-RTStick 2019-1_Long_2019-06-26_Raw”